Challenges and Reforms in Urban Governance

Insights from the development experience of China and Singapore

CLC is a division of

Set up in 2008 by the Ministry of National Development and the Ministry of the Environment and Water Resources, the Centre for Liveable Cities (CLC) has as its mission "to distil, create and share knowledge on liveable and sustainable cities". CLC's work spans four main areas — Research, Capability Development, Knowledge Platforms, and Advisory. Through these activities, CLC hopes to provide urban leaders and practitioners with the knowledge and support needed to make our cities better.

The Development Research Center of the State Council of the People's Republic of China (DRC) is a policy research and consulting institution directly under the State Council, the central government of the People's Republic of China. Its major function is to undertake research on the overall, comprehensive, strategic and long-term issues in economic and social development, as well as pressing problems related to reform and opening up of China's economy, and provide policy options and consulting advice to the CPC Central Committee and the State Council.

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This inaugural publication on urban governance marks the start of a strong collaboration in mutual knowledge-sharing between the Ministry of National Development, Singapore (MND), and the Development Research Center of the State Council (DRC) of the People's Republic of China. This publication is a joint effort by the Centre for Liveable Cities under MND and the DRC to capture and distil the knowledge, insights and lessons from the development experience of both China and Singapore.

Singapore and China share a special bond, with certain profound similarities in culture and values. We also share common aspirations to excel and succeed.

The close ties between our two countries can also be seen in our deepening economic linkages — Singapore is China's top FDI investor and China is Singapore's top trading partner.

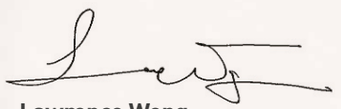
The steadfast friendship between Singapore and China goes back a long time to 1978, when the late Chinese Vice Premier, Deng Xiaoping made his first and only visit to Singapore where he learnt about Singapore's public housing and industrialisation programmes.

The close bonds have been cemented through three Government-to-Government flagship projects. In 1994, the China-Singapore Suzhou Industrial Park was inaugurated to facilitate the transfer of Singapore's public administration "software" to the project. The Sino-Singapore Tianjin Eco-city project was conceived in 2007, and it seeks to become a model for sustainable development in China and the world. More recently, the ***China-Singapore (Chongqing) Demonstration Initiative on Strategic Connectivity*** will seek to enhance connectivity and drive the development of Western China.

With these firm foundations and shared aspirations, I believe there remains significant scope for both countries to continue to share knowledge and learn from each other's development experience.

This inaugural joint publication between MND and DRC is the first tangible outcome from the Memorandum of Understanding (MOU), which was signed between the two ministries, and witnessed by President Tony Tan and President Xi Jinping in July 2015. The MOU aims to facilitate knowledge-sharing between Singapore and China in the areas of urban development, sustainability and liveability, as well as to draw lessons from the development experience of both countries. The scope of collaboration comprises visiting fellowships, joint research and publications. These exchanges between our experts will provide new and important perspectives in addressing today's urban challenges. As the partnership between MND and DRC deepens, I am confident that we will be able to make significant strides in our efforts to address today's pressing urban challenges.

I would like to take this opportunity to thank DRC Minister Li Wei for his strong and steadfast support in forging close cooperation between my Ministry and DRC. I hope readers will find this publication a fulfilling read, and a useful contribution to our search for more liveable and sustainable urban solutions.



Lawrence Wong
Minister for National Development, Singapore

The world is in the process of rapid urbanisation with more than half of the population living in cities. The United Nations predicts that the world's urban population will exceed six billion by 2045. The city is an important engine for economic and social development. Historical experience shows that only by promoting efficient, inclusive and sustainable urbanisation can a country successfully realise industrialisation and modernisation, and head towards a high-income society.

China's urbanisation process see the largest population migration in human history. From 1978 to 2015, there have been over 16 million people in China moving from the countryside to cities and towns on average each year. The three national urban agglomerations of the Yangtze River Delta, the Pearl River Delta and the Beijing-Tianjin-Hebei Region have become the main platforms driving China's fast economic growth and involvement in international economic cooperation and competition. However, while China is making significant progress in urbanisation, it faces many challenges as well, including a series of issues such as the equalisation of public service, "metropolis disease" and so on.

The Chinese government has always attached great importance to urban construction. In recent years, it has convened the Central Urbanisation Work Conference and Central Urban Work Conference successively and advanced the implementation of the National Plan on New Urbanisation (2014-2020). In the process of new urbanisation construction, the Chinese government has paid high-level attention to drawing on the successful experience of advanced countries including Singapore.

2015 marks the 25th anniversary of bilateral diplomatic relations between China and Singapore. On 2 July 2015, President Xi Jinping and President Tony Tan witnessed the official signing of the Memorandum of Understanding (MOU) between the Development Research Center of the State Council of the People's Republic of China and the Ministry of National Development, Singapore. The MOU aims to carry out various forms of joint research and knowledge-sharing projects in the following five years, and the theme of the first joint research project is urban development. Both sides have jointly established a research team led by eminent experts from China and Singapore. This team has convened a series of symposiums centred on areas including urbanisation development models, urban planning and urban governance, urban public housing construction and urban infrastructure financing, and also visited many government departments in China and Singapore, and carried out several rounds of field research. All this work finally culminates in this publication entitled "Challenges and Reforms in Urban Governance: Insights from the Development Experience of China and Singapore", which has gathered key observations from important experiences of urban development in China and Singapore. These include: the division of responsibilities among government departments should be clear to ensure scientific, professional and executable urban planning and urban governance; more flexible trade networks, production collaboration networks and innovative networks should be formed among large, medium and small cities to improve a city's division of responsibilities and efficiency in urban networks; attention should be paid to the connection between public housing policy and social policy; and the PPP (public-private partnership) model should be actively applied to promote urban infrastructure construction.

Singapore is recognised as the world's most liveable city-state. Although densely populated, Singapore has maintained high liveability through scientific urban planning and thorough urban governance, providing valuable experience for the urban development of China and other countries. We hope that this book will not only bring beneficial inspiration for China and Singapore in further explorations in future city development, but also serve as an important reference for urban construction in other countries and to attract more people to participate in the discussion and endeavour to build harmonious, liveable and vibrant cities.

Li Wei

President, Development Research Centre of the State Council, China

Preface

On 20 December 2015, the Chinese government convened its first Central Urban Work Conference in Beijing in 37 years. The conference noted that "cities form the centre of China's economic, political, cultural and social activities", and that "the quality of the urban environment, the people's quality of life and the cities' competitiveness must be continuously improved to build harmonious, liveable and vibrant cities of character; the level of urban development must be raised under the new urbanisation, which will chart a development path with unique Chinese characteristics."

As a city-state, Singapore is significantly smaller than China, although both countries share many similarities in urban development issues and challenges. Since its independence, Singapore has transformed from a dilapidated, poor and backward tropical island-state with squalid living conditions during its early independent days, to the "City in a Garden" today with a competitive economy, a sustainable environment and a high quality of life. Singapore has accumulated extensive experience in urban governance and urban development. As for China, since its reform and opening-up (gaige kaifang), it has experienced rapid and massive urbanisation process in human history. Its urbanisation has unfolded on a magnificent scale and its achievements have drawn the world's attention. However, this process has been accompanied by notable challenges such as the need to improve the quality of the urban environment and urban governance capacity, as well as the need to address urban ills.

Against this backdrop, strengthening mutual learning and knowledge exchange in areas relating to urban development and urban governance between China and Singapore will prove beneficial as this will enable both countries to strive towards greater liveability and sustainability. As Mr Wang Daohan (the late President of Association for Relations Across the Taiwan Strait) said, China will become a great country if it can create 100 cities like Singapore. Likewise, Singapore can draw inspiration and insights from the myriad Chinese cities that are of different sizes, types, character, and at different stages of development, to find solutions to "sustaining the city's liveability amidst limited land and national resources, and an ageing population".

By referencing and analysing historical development experiences of China and Singapore, this publication serves as a good practical reference for formulating reform policies, with a strong focus on pragmatic and effective solutions. The publication consists of five sections. The first four sections focus on the urban development experience of China and Singapore in four areas, namely urbanisation overview, urban planning and governance, public housing, and infrastructure financing. The last section is a synthesis of the key insights and lessons based on the two countries' development experience.

Section 1 on "Urbanisation Overview" provides an overview of the paths, models and policies of the urban development of China and Singapore. Urbanisation in China is proceeding on an unprecedented scale in human history. This transformation drives China's economy growth and brings about profound changes to the social fabric. Meanwhile, it also imposes various challenges on Chinese government such as structural imbalances in urban development and environmental degradation. Under such circumstances, China could leverage on industrialisation and advancements in information technology to achieve its urbanisation targets. By 2020, urbanisation rate in China would likely reach 60%. To achieve this goal, China must remain steadfast to its new urbanisation approach that is efficient, inclusive and sustainable. It should also accelerate the various reforms in areas relating to household registration or hukou system, land system, urban-rural planning and administration system, fiscal, taxation and financial systems, so as to provide the impetus and mechanisms to achieve efficient, inclusive and sustainable urbanisation.

Singapore only took forty years to make the significant leap from a backward, developing country to one of the world's most liveable cities. With a balanced development approach, dynamic good governance and long-term integrated planning, Singapore offers a valuable reference and development model to countries that are attempting to create liveable cities under high-density living conditions. Singapore constantly envisions liveability as the eventual outcome, and the principles which guided Singapore's transformation are encapsulated in the Centre for Liveable Cities (CLC) Liveability Framework which focuses on three critical outcomes: a competitive economy, a sustainable environment, and a high quality of life. The two key underlying systems integral to Singapore's urban success are: first, integrated master planning and development with a long term view; second, dynamic urban governance to sustain the conditions for a liveable city to thrive.

Section 2 on "Urban Planning and Governance" focuses on how China's urban planning has evolved and reformed, and how Singapore has managed urban planning and urban governance and its relevant insights. Since its reform

and opening-up, China's urban planning system has continuously achieved significant improvement. Urban planning has shifted from emphasizing on distribution of physical forms to being policy-oriented, and gradually from scattered planning to integrated planning. Urban planning has also become irreplaceable in urban development. However, as urbanisation progresses, other problems in urban planning begin to emerge such as weakened social functions, lack of coordination among the different plans, and the lack of public participation and inadequate legal frameworks. The old urban planning system is becoming increasingly inadequate and unable to adapt and respond to the strategic requirements of the new urbanisation approach. Therefore, China still has a long way to go in reforming its urban development. To reach the goal of "Better Cities Better Life (chengshi rang shenghuo geng meihao)", future urban planning must return to the concept of "big planning", in that it must transcend the limits of method and technique, and it must meet the integrated functional requirements of urban economies, urban societies and urban services. Urban planning must move towards a systematic, law-based and democratic regime.

Singapore is a small island country, a multi-ethnic society, with practically no resources. However, through the sustained efforts of political leaders and their technocrats over the last 50 years, Singapore has put in placed an effective legislative system to support her urbanization efforts. These efforts enabled the City to carry out enforcement to deliver an orderly, efficient and liveable world class city. The factors of its success are due essentially to her intelligent public administration culture, intelligent urban planning as well as intelligent implementation system. Both the government and the technocrats have been paying close attention to the feedback and suggestions from the people and the experts. Through conscientious search for successful examples of urbanization internationally and adapting to its local conditions, Singapore has ingenuously developed into a metropolis, capable of satisfying the basic needs of her people as well as providing the momentum for a long term sustainable development.

In the context of planning, China and Singapore are similar in many ways. For example, the high state land ownership as well as the urbanisation implementation system. As China is in the process of massive and rapid urbanization, the government at different levels would clearly want to pay close attention to good urban planning. In this regard, the Singapore experience on intelligent urban planning can be a very helpful reference for China to meet the challenges of urbanization by systematically explaining the intelligent urban planning concept, the methodology, the principles and implementation process in Singapore. Some examples of how the Singapore approach on intelligent urban planning has been applied to urban planning projects in China have also been included for illustration purpose. Through referencing and relating the Singapore planning practice to China's urban conditions, suggestions are made to help China improve its urbanisation process including a vision for future of Chinese urbanisation.

As the world continues to urbanise at an accelerated pace, cities will have to cope with unprecedented challenges. With people, institutions, markets and networks interacting with each other in dense and imperceptible ways, cities, as complex systems, will increasingly experience black swans, hard-to-predict events with a large impact. The continued existence and relevance of cities will be determined by how they respond to these unpredictable events. Harnessing existing and acquiring new capabilities, developing complex competencies for new connections and value propositions will equip cities to respond better to shocks and stress. Cities will then be able to reinvent and remain resilient and relevant in the long-term. How do cities work towards this scenario? Using Singapore as a case study, the chapter on "Complexity and Urban Governance" illustrates how a foundation of good governance is key to integrating political will and success elements to translate the vision of a liveable and resilient city into reality for its people. The Whole-of-Government approach, the foundation of urban governance in Singapore, facilitates the breaking down of organisational silos to tackle the wicked problems of complexity. Through active public engagement, futures thinking, cultivating an innovative culture with effective use of data, Singapore demonstrates how the complexity of cities can be managed with effective urban governance.

Section 3 on "Public Housing" explores the construction and development of China's housing security system and Singapore's public housing system. China's housing security system originates from the reform of its housing system, and evolves as a result of continued exploration and accordance with China's national circumstances and its urban development phase. It is now an integral part of China's public policy system. Since the reform and opening-up, China has continued to improve its housing security system with tangible results. As of end 2014, more than 40 million urban households or 100 million people have benefitted from various security housing schemes. Furthermore, over 20% of the urban households are covered under the urban affordable housing programme. Nonetheless, the daunting challenges continues to confront China's housing security system including the increasing shortage of local matching funds and medium- to long-term repayment pressures, difficulties in resettlement (chaiqian nan), and rising construction costs. Other problems include post-construction operations and administration systems for security housing, and an inadequate legal framework governing housing security.

To establish a sound housing security system in China, development targets should be based on the local practical realities and executed by local

governments to the best of their capabilities. To mitigate the problems of resettlement, a coordination mechanism to balance various interests should be established for demolition and relocation (chaiqian) efforts. In addition, the government should increase its subsidies for the poorer regions, encourage diversification of financing channels, improve its financing and loan policies for policy-driven initiatives, and maximise efficiency of loans. It should also optimise the housing security system, and enhance efficiency when allocating public housing resources. "

Singapore's public housing programme can be said to be the most successful in the world. It houses 82% ofits residents, of which more than 90% own their homes. Without public housing, Singapore would be a different country. Singapore's Public Housing article tells Singapore's public housing story — its core principles, the ingredients of its success, and how it has made Singapore a nation. It distills how Singapore has, through foresight, gumption and zeal, housed its population – providing not just a roof for its lower-income residents but in meeting the aspirations of the middle income households as well. It outlines how legislative tools, use of technology and pragmatic wisdom of HDB's leadership have been key to the accomplishments in public housing. But more importantly, beyond the brick and mortar, it underlines how social objectives, interweaved through urban planning and implementation of public housing policies, has forged a unique national identity and collective experience among Singaporeans, turning houses into homes, townships into communities, and country into nation.

Section 4 on "Urban Infrastructure Financing" analyses how China promotes and applies the Public-Private-Partnership (PPP) model in public infrastructure development, and examines the fundamental principles and approaches undertaken by Singapore to finance infrastructure development. Chinese government is reviewing its financing system so that it can meet the demands of new urbanisation. It becomes imperative to develop a rational, clearly-defined, transparent, diverse and sustainable financing system to support the efficient, inclusive and sustainable urbanisation. In fact, PPP has become an important impetus to stabilising investments and growth, and to drive reforms of the investment and financing systems, and to accelerate transformation of the local government financing vehicles (LGFVs). All levels of government are thus attaching important significance to the PPP model. Currently, the government has established basic policies for PPP commenced work on some PPP projects, with more projects waiting in the pipeline.

Nonetheless, as the current systems and mechanisms are still not well-aligned to the needs of PPP, the PPP model has received mixed responses. The successful implementation of PPP model will help create innovative governance structures, improve efficiency in fund use and supply of public goods, or prevent fiscal risks. It will also be beneficial for the people-centric urban development and management. To ensure that the PPP model is applied consistently and achieves the best results, the following approaches will be critical: create an efficient coordination mechanism; provide incentives for private capital to participate in PPP projects; improve the effectiveness of local governments in implementation; strengthen legal frameworks and policies; leverage on professionals and professional organisations; and mitigate risks.

Singapore was confronted with a classic development challenge in the 1960s, and faced with the urgent need to build infrastructure urgently for economic and social development such as public transport, roads, housing, waste disposal, water supply and sewerage, and to keep pace with a fast-growing population, but its finances was tight amid competing demands. In financing public infrastructure, the Government adhered to the principles of fiscal prudence and long-term financial sustainability; deploying market principles and working private sector where appropriate. The Government created the necessary institutions and systems along the way to implement its development plans and financing approach. The Singapore Infrastructure Financing article reviews the development of public infrastructure and services in Singapore, identifying the broad principles that have guided the city-state in financing development. It draws examples from public transport, public housing, water supply, waste management and land development to provide insights on the application and evolution of its financing principles.

Urban development is an important engine for modernisation and has a significant impact on socioeconomic development of cities. This publication is based on the development experience and reforms of Singapore and China, and their respective journeys in creating liveable and sustainable cities. Hopefully, this work will provide some food for thought and be a useful reference for aspiring cities as they strive to create harmonious and liveable modern cities that are vibrant and distinct in character.

ONE

Urbanisation Overview

China's Urbanisation
The Path, Paradigm and Policies

LIU Shijin, HAN Jun, HOU Yongzhi, LIU Peilin, HE Yupeng, LIU Yunzhong, ZHUO Xian and JIA Shen

History has no record of an urbanisation process that involves a population of 1.3 billion, which our country is currently in the process of. We simply cannot continue destroying the environment and treating our surrounding with poor civic sense. At this junction, we have to pave a new approach for urbanisation, effectively executing the process.

Quote from People's Republic of China President Xi Jinping's speech during 2013 China's Central Urban Work Conference

Urbanisation is a fundamental way to narrow the gap between the urban and rural areas and provides the largest source of domestic demand. We strive for urbanisation to be people-oriented, focusing on the three main tasks concerning 100 million people,[1] and fully leveraging on the role of urbanisation in modernisation..

Quote from 2015 Report on the Work of the Government, People's Republic of China Premier of the State Council Li Keqiang

Urbanisation is a process that lies at the heart of modernisation. Being the largest population migration in human history, urbanisation in China has now entered a critical phase, where the process must be skilfully managed to catapult the country into the high-income league. A paradigm shift is thus needed, in that China must adopt a new urbanisation approach that is efficient, inclusive and sustainable.

China's urbanisation: *significant progress*

China witnesses accelerated urbanisation. Since the founding of the People's Republic of China in 1949, urbanisation has evolved, from falling far behind industrial development to basically keeping in pace with industrialisation. China's urbanisation path is marked by four distinct phases:

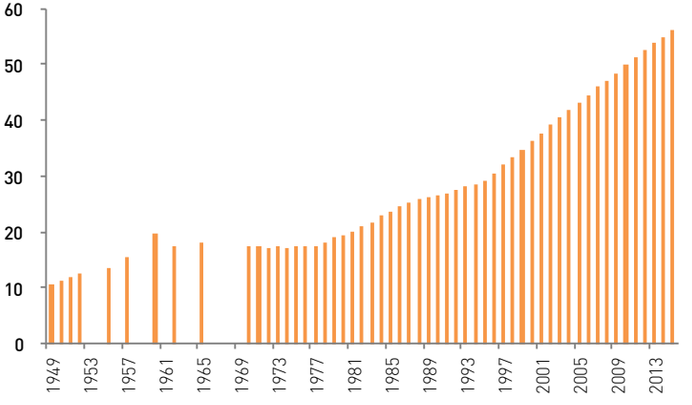
[1] Namely, granting urban residency to around 100 million rural people who have moved to cities, rebuilding rundown city areas and urban villages where around 100 million people live and guiding the urbanisation of around 100 million rural residents of the central and western regions in cities there.

(1) Period of planned economy, during which the urban-rural divide impeded mobility. This caused urbanisation to stagnate for a long time and to seriously lag behind industrialisation. Between 1952 and 1978, China's industrialisation intensity rose from 17.6% to 44.1%; however, the degree of urbanisation over the same period only increased from 12.5% to 17.9%.

(2) Initiation of reform and opening up policies (*gaigekaifang*) which rebooted China's urbanisation process. Job creation by township and village enterprises (TVEs) attracted massive rural labour migration. Over time, the government relaxed restrictions on rural migration. The degree of urbanisation increased from 18% in 1978 to 27.5% in 1992.

(3) Development of the socialist market economy, which accelerated urbanisation and was conducive for massive cross-regional labour migration. The degree of urbanisation in China increased from 27.5% to 50% between 1992 and 2011, 30 years shorter than the world's average time taken for the same rise.

(4) After the 18th National Congress of the Communist Party of China, the strategic focus of urbanisation turned to improving quality and efficiency. Policies were directed at turning rural migrants into urban *hukou* holders ("*shiminhua*", i.e., citizenisation), ensuring equal access to basic public services, and promoting green and low-carbon urban development. Urbanisation in China has since entered a new phase.



China's urbanisation rate from 1949 to 2015. (Unit: %)
Source: National Bureau of Statistics of China

Urbanisation in China is the most spectacular modernisation and transformation process in the history of human society. Its urban population grew from 170 million to 770 million between 1978 and 2015, increasing by an average of 16.18 million people every year. This increase was especially significant between 2010 and 2014 with an annual increase of 21 million, which is higher compared to a medium-sized nation in Europe. Growth of urban population enables the mismatch between urbanisation and industrialisation intensities to narrow significantly. In 2015, the degree of urbanisation reached 56.1%, surpassing the global average. Today, cities have become a powerful engine of economic growth. The number of cities (including prefecture-level cities and county-level cities) in China has risen from 193 in 1978 to 649 in 2014, and the number of designated towns[2] from 2,173 to 20,401 during the same period. Prefecture-level and above cities account for 6.7% of China's total land area and 29.5% of its population, and contribute 62% of the national Gross Domestic Product (GDP) and 61.9% of total domestic consumption. Connectivity between cities has improved. Together, the three national-level city clusters of the Beijing—Tianjin—Hebei Region, the Yangtze River Delta and the Pearl River Delta, as well as several regional city clusters, create an increasing agglomeration effect during the urbanisation process. With 2.8% of the national land area, the three city clusters gather 18% of the national population and create 36% of the national GDP, thus becoming the main platforms driving China's fast economic growth and involvement in international economic cooperation and competition.

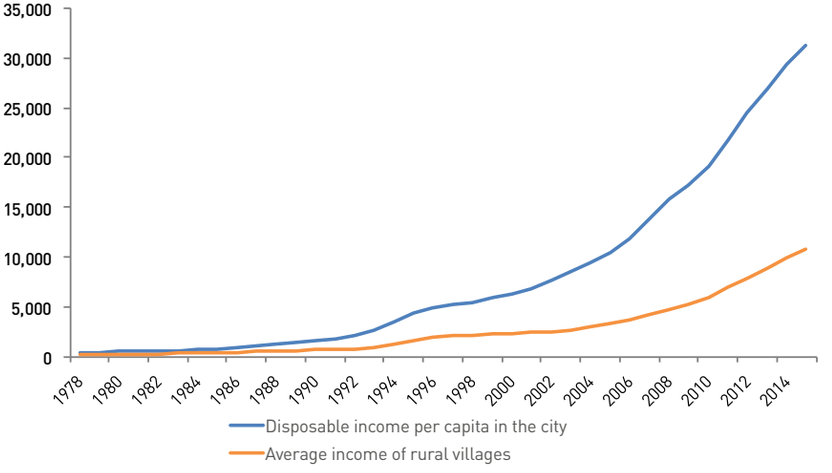
Table 1: The changes in number and size of Chinese cities.

Index	*1978*	*2010*
Cities	**193**	**658**
Cities with a population size above 10 million	0	6
Cities with a population size between 5 to 10 million	2	10
Cities with a population size between 3 to 5 million	2	21
Cities with a population size between 1 to 3 million	25	103
Cities with a population size between 500,000 to 1 million	35	138
Cities with a population size below 500,000	129	380
Designated Towns	**2173**	**19410**

Source: National Development and Reform Commission, National New Urbanisation Plan (2014–2020).
Note: Numbers of 2010 are from China's sixth national census results.

[2] Designated towns refer to towns designated after the approval from the people's government of provinces, autonomous regions and municipalities.

Urban and rural residents enjoy the increasingly enriched material and cultural benefits from the process of urbanisation. Urbanisation in China not only led to a rapid economic development, but also profound changes to the social structures. During the period of rapid urbanisation, the country experienced a significant improvement in terms of facilities such as water, electricity, gas, roads and telecommunication, a higher quality of life in terms of public services such as education, healthcare, culture, sports and social security, and a substantial increase in per capita housing, park and green areas, thus achieving a leapfrog development of "hard environment" and "soft environment" for urban residents to live in. In unison, rapid urbanisation resulted in more job opportunities in the cities, facilitating the movement of rural villages to the cities to gain a steady source of income. Urbanisation further enhances the efficiency for allocating urban and rural production elements, and promotes the overall improvement of the residents' living standards. Compared to 1978, both urban and rural incomes have increased more than tenfold.



The change in income for rural residents from 1978 to 2015. (Unit: RMB)
Source: National Bureau of Statistics of China

Table 2: The change in urban infrastructures and services provided in Chinese cities.

Index	*2000*	*2014*
Percentage of clean water supply (%)	63.9	97.64
Percentage of gas supply (%)	44.6	94.57
Road area per capita (m^2)	6.1	15.34
Greenery area per capita (m^2)	3.7	13.08
Number of hospital beds per 10,000 people	23.8	48.5

Source: National Development and Reform Commission, National New Urbanisation Plan (2014-2020); National Bureau of Statistics of China

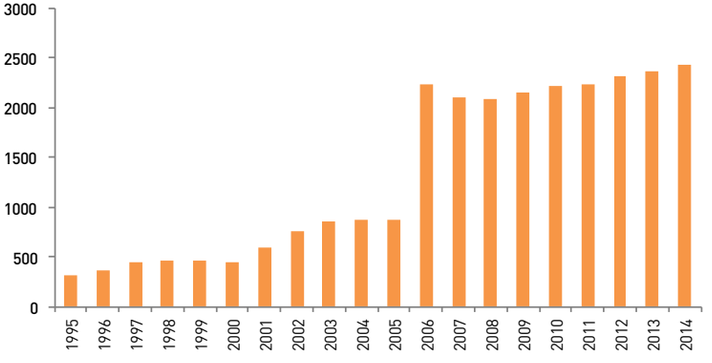
China's achievements coupled with potential problems in urbanisation

Despite the notable achievements, China's urbanisation process has been plagued by quality problems and structural imbalances. First, the potential of urbanisation to improve economic efficiency has not been well-harnessed. The urban agglomeration effect is weak, with few big cities and few city clusters having tight internal connectivity and complementarity in division of labour. Typically, urbanisation in China is marked by inefficient utilisation and allocation of urban resources, haphazard and disorganised use of land, water, energy and other resources, and continued limited mobility of the labour force. Other striking problems include inappropriately administered controls of land allocation within and between cities, and between urban and rural areas, and improper functional differentiation of large cities. Innovation is still weak in the cities, as urban infrastructures and urban policies continue to disfavour agglomeration of factors for innovation, or unleashing of innovation energies, or dissemination of innovative knowhow.

Second, Chinese cities and towns are troubled by serious inequality and lack of inclusiveness. Most rural migrants work in low-skilled and low-pay sectors in urban areas, and have no access to basic public services that urban residents enjoy. Land acquisition, demolition and resettlement ("*chaiqian*") have deprived many urban residents of land and livelihood, and poverty is becoming an increasingly visible urban phenomenon. In recent years, many young and well-educated people, who are living in megacities and squeezed by high rentals and low income, are barely eking out a living. This stratified urban society has led to antagonism between different social groups.

Third, grave environmental problems in urban areas undermine the fundamentals of sustainable development. Pollution in the cities has worsened, and air pollution has become a national, or even global, concern. Cities are overloaded with waste. The volume of municipal waste is straining, or has, in some cases, exceeded the city's disposal capacity. Traffic congestion has compromised the efficiency of big cities, and public discontent is on the rise.

There will be more social risks when more than half of the population are urbanised. Compared to developed countries, urbanisation in China has taken significantly less time, and this means that it will have to deal with harder, and far more intractable challenges. Rapid urbanisation in the past has created myriad economic, social and environmental problems, which are largely invisible against breakneck speed economic growth. In the future, as slow growth becomes the global norm and competitive advantages wear thin at home, China's economic growth will shift to a lower gear. As soon as the economy slows down, the problems accumulated in the past may emerge, with mounting employment pressures and increased credit risks on the part of local governments. As the society enters a phase where an urban lifestyle dominates, economic relations will become more complex, and social structures more diverse. The focus and challenge of governance will change, as the old approaches are no longer relevant to the new circumstances. Old problems and new complexities will intermingle, which, if managed inappropriately, will erupt into conflict; and in a society where information travels quickly via the Internet, they could spiral into widespread social unrest if managed improperly.



The change in China's urban population density from 1995 to 2015. (Unit: person/sq km)
Source: National Bureau of Statistics of China

Both achievements and problems are intimately linked to China's urbanisation approach. China's approach to urbanisation can be summarised as follows: Given that the country is gradually redressing the urban-rural dual structure, a strong government intervention and burgeoning market forces have triggered rapid urbanisation. However, inappropriate delineation of government and market functions has stymied both government and market operations. There are six main issues:

(1) Despite its strong will to urbanise, the government overemphasises speed and overlooks quality. With a growth-based key performance indicator (KPI) system, local government leaders are driven to expand a city's scale and GDP, while neglecting resource efficiency and inclusiveness of growth.

(2) Focus on expansion of urban space, but neglecting the agglomeration of urban population. Many governments have been aggressively acquiring land to build cities, such that the size of urban land expands faster than the urban population.

(3) Rural labour transfer to non-agricultural sectors outpaces the change of *hukou* status of rural migrants. With fiscal power disproportionately smaller than their mandates, local governments have no incentive to provide the same public services for the migrant population.

(4) Focus on urban development, but neglecting the urban management. The governments of all levels have invested heavily in energy, communications, roads and other infrastructural development, but are not concerned with urban traffic management, environmental governance, preservation of historical and cultural heritage, and population and social management.

(5) Focus on developing the downtown area, and neglecting the integrated urban-rural development and coordination within a city cluster. Local governments have applied themselves to powering their downtown areas into the top echelons of elite downtowns, and concentrated their resources in cities of higher administrative status. At the same time, rural areas and small and medium-sized cities have received little attention and investment.

(6) Although both government and market forces are at play, certain government interventions have been inappropriate. Local governments have used land as the primary financing tool to attract huge infusion of private capital for urban development. At the same time, governments have overused their administrative power to intervene in industrial development, change of land use and land transactions.

Urbanisation unlocks enormous potential for China

China must pursue high-level and high-quality urbanisation to leapfrog the middle-income gap, rise into the high-income ranks, and realise the Chinese Dream. Urbanisation will bring several major benefits:

(1) Urbanisation will be the main booster of domestic demand. It also holds tremendous investment potential, as urban population growth will spur demand for infrastructure and housing. Urbanisation is also accompanied by an enormous consumer demand. As the urban population grows and incomes rise, consumer demand will continue to expand. Urbanisation also generates new types of demand. Labour specialisation and the application of new technologies will create demand for living-related consumption and manufacturing services.

(2) Urbanisation helps create high-quality jobs and expand the middle-income group. As traditional industries move up the value chain, and as new industries emerge and modern service industries develop, job opportunities will be created. This, in turn, leads to a sustained income growth and steady expansion of the middle-income group, which are conditions that favour social stability.

(3) Urbanisation attracts and drives innovation, and increases productivity. As factors of production and economic activities agglomerate in cities and city clusters, they help expand economies of scale; and as capital, information and talents pour into and flow within the city network, they stimulate innovation activities and expedite the spread of innovation. All these activities will boost a city's economic vitality and foster competitiveness.

(4) Urbanisation contributes to resource conservation and environment protection. As more people move into cities, development intensity and exploitation of state land, especially the ecologically fragile areas, will ease. Agglomeration of population is conducive to more intensive use of land and other natural resources, to centralised and efficient treatment of pollutants, and to reduction of ecological stress.

(5) Urbanisation enables urban-rural integration and coordinates regional development. Furthering urbanisation creates more non-agricultural jobs and expands demand for agricultural produce. It also improves the efficiency of large-scale land operations, which effectively lead to rapid growth of rural incomes.

As the rural population migrates from underdeveloped regions to cities and as the scale of urban economies expands, regional disparities will be reduced. Ensuring equal access to public services during the urbanisation process promotes integrated urban-rural development and coordinated regional development. In short, urbanisation is a significant growth-driver, whether in terms of supply- or demand-driven growth. Based on a model developed by the Development Research Center of the State Council of China, over a considerable period of time in the future, every one percentage point increase in degree of urbanisation contributes to a rise of 0.4 to 0.6 percentage point in economic growth.

Going forward, China's urbanisation path is still blessed with favourable conditions. Opportunities for development still abound, in five main areas:

(1) Industrialisation will continue to drive urbanisation. Currently, China is still transitioning from mid-phase to late-phase industrialisation, and has quite some way to go on its industrialisation path. It also has a huge potential to develop its advanced manufacturing industry and producer services industry.

(2) Modernising agriculture will free up more labour resources. The increasingly sophisticated agricultural technology and machinery, and improvements to the production methods, organisation and operations of agricultural activities will raise productivity in the agricultural sector, which will, in turn, re-channel sufficient labour into the urban sector.

(3) Information technology will improve urban governance. Extensive application of information technology and development of smart cities will provide greater living conveniences and improve urban public services and social management. Use of information technology will also improve disaster preparedness and response, reduce "urban diseases" and promote urban sustainability.

(4) Globalisation will continue to drive urbanisation. Further opening-up will help reshape the division of labour among different cities, facilitate learning of best practices in urban governance from the advanced cities, promote urban economic growth and consolidate the physical and technological bases needed for urbanisation.

(5) The beneficial outcomes of reform will unlock the enormous potential of urbanisation. Revamping the *hukou* system, the land system, the social security system and the fiscal and taxation regime and improving entrepreneurship and innovation policies will create a robust ecosystem for urbanisation to progress.

Urbanisation in China has great prospects for development. Given the opportunities and challenges, and without compromising quality, the degree of urbanisation in China is expected to reach 60% in 2020 and 65% in 2030. A few main trends are likely:

(1) Urbanisation of rural migrants will continue to increase. By 2020, urban public services will cover all permanent residents; by 2030, basic public services will be equalised in urban and rural areas.

(2) The spatial layout of urban land will be optimised significantly. The eastern region will concentrate on building mainly city networks, the central region on developing city clusters, and the western region, with abundant resources and better environment quality, will focus on developing central cities.

(3) The ability of cities to support industries and to attract and accommodate population will strengthen substantially. Large cities, especially megacities, are seeing a better, and more diversified, industrial structure, whereas the small and medium-sized cities see growing specialisation with more distinctive industries. Greater rationality in terms of division of labour and coordination between cities of different sizes has produced more innovative and internationally competitive cities.

(4) The liveability of the different types of cities will improve appreciably. The middle- and low-income groups now enjoy better housing, and urban diseases such as traffic congestion are clearly mitigated. Also vastly improved are the public transport system and the urban environment.

(5) The different social strata will find a way to live harmoniously with each other. In general, the dualities between urban and rural areas, and within cities, will also be eliminated. People from all walks of life will be able to

enjoy the same development opportunities and outcomes, and orderly participation in community and urban governance. All in all, one will see a marked improvement in social integration.

The new approach to urbanisation with Chinese characteristics: *an efficient, inclusive and sustainable path*

New urbanisation with Chinese characteristics has rich connotations. Global experience has shown that all countries reaching the middle-income level would become about 50% urbanised, with the degree of urbanisation in all high-income countries at more than 70%. Without urbanisation, modernisation will not be possible. If urbanisation lags, the factors of production will not be optimally allocated. Resource efficiency will also be low, and economies of agglomeration and sustainable economic growth will be compromised. However, merely increasing the degree of urbanisation does not engender modernisation. Certain discipline must be observed, without which, obsession with the speed of urbanisation without considering employment, public service and infrastructural issues may interrupt, or even reverse the modernisation process. Therefore, urbanisation in China should not only observe the general rules, but also account for national conditions and institutional particularities, so as to embark on a new urbanisation approach with Chinese characteristics.

Compared with urbanised countries in Europe and America, urbanisation in China takes place against a different backdrop, in that it does not export its population to alleviate the employment, resource and environmental strain at home; instead, it has to deal with many new challenges brought about by global climate change. Therefore, China cannot duplicate the earlier models of "economy before society" and "pollute first and clean up later" used by developed countries. China is populous but resource-scarce, and has a small ecological capacity and large regional disparities. It must set realistic urbanisation targets and avoid being over-ambitious. China's urbanisation drive must ensure a balance of "three major relationships": the relationship between industrial development, provision of employment opportunities and population agglomeration; the relationship between urban development, resource use and the environment's carrying capacity; and the relationship between the rural population concentrating in urban areas and optimisation of urban space and coordinated urban-rural development. In China, urbanisation should not only improve the efficiency of resource allocation and agglomeration of inputs, but also better meet the people's growing need for inclusive development, and for greater social equality and justice.

Basically, China's national conditions and institutions determine that its urbanisation must be people-oriented and well-planned. It must also optimise the urban structure, and ensure that the urbanisation process is coordinated and the "three major relationships" balanced. Urbanisation should be underpinned by the capacity to provide employment and centred on enabling the rural migrants to receive urban *hukous*. It must also ensure development of green and low-carbon cities and be driven by reform and opening-up. In other words, China should pursue an urbanisation path that is efficient, inclusive and sustainable.

Efficient urbanisation means relying on both market forces and government regulations to allocate resources between urban and rural areas, between different cities, and within cities to strengthen the innovation capabilities of urban areas, maximise urban agglomeration effects, and continue to improve productivity. Urbanisation efforts should focus on eliminating the institutional barriers that hamper resource flow between urban and rural areas and between different regions. They should also give priority to building modern infrastructure to improve connectivity and to create conducive conditions for building functionally well-differentiated, closely-connected and vibrant urban systems and for integrated urban-rural development. The urban spatial layout should be optimised to enhance the cluster effects, improve the urban innovation system, and promote urban transformation.

Inclusive urbanisation means giving full play to the initiatives of government, business and other social players, such that everyone has equal access to development opportunities and equal enjoyment of the fruits of urbanisation in the form of material possessions and culture. It also means facilitating harmony between the different social strata, so that the city would become a vast stage where the best opportunities are shared and synergised. Creating jobs is the central task of urbanisation, and industrial development, employment and population growth should be properly balanced. Integrated basic public service systems for both urban and rural areas should be built and improved, so as to improve the availability and quality of public services. Inclusive urbanisation also involves strengthening the capacity of workers and creating a reasonable primary and secondary income distribution system to narrow income

gaps over time. The government should ensure that basic living needs of low-income people in respect of healthcare, housing, and food safety are provided for, and should help migrant workers integrate into the corporate environment, their children into schools, their families into communities, and the migrant community into the society. Improvement of urban governance involves improving its public participation system and designing innovative ways in urban governance, so as to build a democratic, orderly, stable and harmonious urban environment.

Sustainable urbanisation means being guided by the tenets of ecological urbanism with green industries, green consumption, green institutions and harmony between man and nature. Sustainable cities should be resource-efficient and environment-friendly, employ new technologies to transform and upgrade traditional industries, and develop new industries. Sustainable urbanisation means increasing the share of modern service industries in the economy and creating a green industrial system. It also implies advocating green consumption along with effective incentives to promote low-carbon travel, resource-efficient living and rational consumption. Finally, sustainable urbanisation requires strengthening urban ecological protection and environmental governance capabilities to create a resource recycling system and improve urban liveability.

Efficiency, inclusiveness and sustainability are factors at the cornerstone of the new urbanisation paradigm. Efficiency means maximising social wealth using the least possible resources and optimal allocation of inputs. It serves as the material foundation for inclusive and sustainable development. Inclusiveness means urban development for all and benefits shared by all. Equity generated from inclusiveness will provide strong support and a guarantee for sustainable and efficient development. Sustainability means constantly increasing the resource and environmental carrying capacity of urban areas, which is not only critical for efficient development, but also the ultimate goal of urbanisation.

Reform will continue to be the driving force and the fundamental underpinning of efficient, inclusive and sustainable urbanisation.
In the near future, as the socialist market economic system matures, urbanisation will make further inroads in China. For the smooth realisation of urbanisation targets, we should focus on deepening the reform in five areas:

(1) Accelerating *hukou* reform and ensuring basic public services for permanent residents.
First, *hukou* reform can be accelerated based on the principle of "two stables" and a "point system". The *hukou* system restricts population mobility, inhibits the development of urban agglomeration, and obstructs social inclusion. However, abruptly lifting *hukou* restrictions will cause a surge in the cost of providing urban public services. Therefore, the *hukou* system should be gradually reformed to allow migrants with stable employment and stable housing in the cities to obtain residency status. Restrictions on *hukou* transfer in small townships and small- and medium-sized cities should be removed, and the qualifying criteria in large and mega cities should be relaxed so that qualified rural migrants can obtain urban *hukous*. In mega cities (or towns) with a high proportion of migrants and floating populations, *hukous* are handed out based on a "point (*jifenluohu*)" system. Those who do not qualify for permanent residency or do not wish to have permanent residency will be administered under a temporary residential permit system, and rights will be granted incrementally. Obtaining a temporary residential permit should not be conditional on meeting any criterion, so that migrants will continue to have access to basic public services. The types of social entitlements for migrants should be gradually increased along with the holding period of temporary residential permit. Thus, migrant residents holding temporary residence permits for a certain period will enjoy the same treatment as urban residents, regardless of whether or not a resident decides to obtain permanent residency. This will allow convergence of the temporary residence system and the *hukou* system.

Second, establishing the "national basic social security package" and achieving universal and equitable access to basic public services is another key factor. The migrant population cannot integrate into urban life mainly because the basic public services at the local level are tied to the *hukou* system; that is, these services are not portable. What they need is an accessible, equalised and portable "national basic social security package" provided by the central and provincial governments. The security package could include: a unified personal account system for basic old age insurance, whose fund is centrally managed; medical insurance subsidy that is "portable", such that when an insurance holder moves across administrative borders, the higher level government will bear the subsidy; standard compulsory education funding based on student numbers borne by the central government; and uniform and fixed subsidies for recipients of subsistence allowance. These entitlements should be entered into a unified personal social security card and accessible to every Chinese national.

The social security card should consist of a subsidy settlement function and should be acceptable anywhere in the country.

Third, establishing a rental subsidy-based housing security system to meet urban housing demands would be a significant benefit. The existing housing security system does not provide for the urban migrant population, and the mode of investment and financing and construction are not sustainable. Governments should establish and phase-in a housing security system for the new migrant population based on specific conditions, so that migrants who have stable employment and who have been contributing to social security are covered under the scheme and enjoy equal access to housing. Housing security policies should gradually shift from rental housing allocation to a rental subsidy-based scheme, together with other forms of protection. Governments allocating land for development should give priority to low-income housing, and should ensure a good balance of land for developing low-income housing with industrial distribution, development of public service facilities, rail transit and infrastructure development. They should also regulate the housing rental market and expand the channels of housing supply.

Fourth, two "decouplings" and two "couplings" to create a service administration mechanism that favours population mobility should be considered. To promote urbanisation of rural migrants, access to basic public services should no longer be tied to the *hukou* status, and permanent urban residency should be granted irrespective of whether migrants have given up their contracted land and homestead (*zhaijidi*) at home. The government should improve the existing public services available to migrants, and future policies should not be based on their *hukou* status. Upon achieving urban permanent residential status, migrant workers should be free to decide if they wish to dispose of their farmland, grassland, forest land and homestead that they have contracted. They should not be compelled or be subjected to disguised compulsion to give up their property. A healthy urbanisation process requires that urban development land and transfer payment be tied to the number of migrants receiving basic public services. Cities and towns are encouraged to attract population inflow as the primary task in their urbanisation drive.

(2) Advancing land reform to improve allocation and efficiency of use of land resources.

First, validation of land rights (*quequan*) to establish the institutional basis to protect land and property rights. The ambiguous definition of land ownership affects the land rights of rural residents. The time of assumption of land ownership by the members of the collective should be ascertained and the value of collective assets effectively quantified to ensure that contractual relationships of rural land remain unchanged. The verification, registration and issuance of certification pertaining to the ownership of rural contracted land, homestead and homes should be done through a unified land-based registration system. Based on the existing land ownership structure, rural residents should have the right to dispose of, mortgage and transfer their collectively-owned land.

Second, building a unified urban-rural land market based on equal access, fair trade and efficient allocation. Under the current land acquisition system, rural land cannot be directly traded in the urban development land market. Low acquisition prices not only harm the interests of rural residents, but also lead to inefficient use of urban land. Land use should be well-planned and regulated and the land taxation system improved to allow rural collective land to be traded in the non-agricultural land market in the same way that state-owned land is traded. An open trading platform should be established to enable equitable land trading based on uniform rules and with multiple suppliers. An effective land pricing mechanism should also be created within the unified land market. A vibrant land market requires the creation of a more robust secondary market for the leasing, transfer and mortgage of land.

Third, overhauling the land acquisition system to allow landowners a fair share of the increased land values. Currently, the government collects most of the increase in land value while the rural residents are not equitably compensated. Income from land value increase is also spent inappropriately. The government's scope for land requisition should be narrowed and be limited only to public interest uses. For land taken for public interest purposes, compensation should be based on fair value instead of on original use. Rural housing that is acquired should be compensated at market price, and rural residents who have lost their land should be included in the urban social security system. The land sale system and land use model should be revamped, and the proportion of urban development land and agricultural land retained by rural residents should be rationally determined. Also necessary is a national land fund system that pools a certain percentage of land revenue to be used as reserves to smoothen market fluctuations and prevent the local fiscal health from being affected. This ensures rational allocation of "year to year" land sales revenue.

Fourth, improving the land and property tax system and creating a rational and efficient land transfer mechanism. The irrational design of the current land tax regime, given the way the tax categories and tax rates are determined, fetters the regular transactions and transfer of real estate property and fails to curb land speculation. The taxation regime for land ownership and transfer should be fundamentally redesigned and systematically reformed. Taxation on land ownership should change from a mainly specific tax regime to a comprehensive ad valorem tax regime to allow greater flexibility. Also, value-added tax should be levied first on collectively-owned development land, land reserves and hoarded land. This way, land and real estate tax can play a bigger role in contributing to local governments' fiscal revenue. For land transfer, the overall tax rate and the turnover tax should be lowered to improve the efficiency of land allocation and use. Improving collection and management of turnover tax proceeds allows taxation to be leveraged for equitable distribution of wealth.

Fifth, separating the government's land administration function from its operation function, and establishing a modern land administration system based on land title management and land use control to improve the system of operation for state-owned land. A spatial planning system for state-owned land should be established, and implementation of the land use master plan strengthened, so as to control land use according to law. Also, land title management should be enhanced by establishing a unified land register system, and land quota approval and annual planning should be phased out and replaced with a land administration accountability system commensurate with the power and responsibilities of the central and local governments. Governments should generate income from land operations of state-owned land asset companies rather than relying on land sales. Land reserve institutions should be reformed, and a state-owned land exchange should be established instead. The use of income generated from state-owned land should also be better managed. The authorities should specify that income generated from state-owned land cannot be spent within the current period, and that the use and efficacy of use of such income is subject to supervision and review by the People's Congress. Similarly, the financing system for state-owned land must be restructured. Land that is used as security to obtain financing should have clear title and use rights and unambiguous ownership, and should be assessed by an independent and impartial external party. Where irregularity occurs, violators will be severely punished under the law.

(3) Promoting fiscal and tax reform to open up new financing channels for urban development.

First, redesigning the primary sources of urban tax revenue to reduce the local government's dependence on the land-based fiscal regime. In the urbanisation process, land sales revenue has been the primary source of financing for infrastructure development, and land is also the main source of capital and security for local government financing vehicles. This results in the over-dependence on land on the part of local governments. The replacement of business tax by value-added tax will recalibrate the revenue structure of the central and local governments. Local governments should create an income regime that relies on consumption tax and property tax as stable sources of revenue to reduce their dependence on land-based fiscal income. Reform of the consumption tax system should also speed up. Under a consumption tax regime, tax is applied at the point of consumption, and consumption tax becomes a local tax. Vehicle purchase tax should also be re-designated as a local tax. Consumption tax should be collected at the point of sale instead of the point of production, and should be excluded from the displayed price. Real estate tax should become the main source of revenue for district or county level governments. A sound nationwide online real estate registration system should be established, and the principles and mechanisms for appraising the fair market value of real estate clearly defined. After a three-year transition period, the government should levy property tax across the country. Following the universal implementation of property tax, the government should assess the national circumstances and consider better tax incentives and restrictions. The tax authorities should be objective and impartial, and should establish an appropriate dispute resolution mechanism.

Second, ensuring reasonable allocation of mandates between the central and local governments and improving the sharing mechanism of public services spending. Currently, public services in China are mainly financed by local governments. Due to the imbalance between their fiscal power and mandates, local governments cannot provide public services effectively. By redefining mandates and responsibilities, the costs involved in providing public services should be appropriately shared between the central and local governments. The central government's mandate and hence spending should be expanded to cover basic and cross-border mandates which can be managed online, such as basic pension, judicial system, food and drug safety, border security, territorial waters and cross-border river basins. The government should increase general transfer payments, and reduce

or consolidate special transfer payments. It should modify the method of calculating transfer payments such that it is based on the number of permanent urban residents rather than their *hukou* status. Other areas of improvement include lowering the administrative regulation barriers to entry for provision of quasi-public services such as water, electricity, natural gas, public health, culture and sports to enable access for a greater diversity of suppliers. With sound supervision of the public and private sectors, a regulated regime whereby both sectors participate and compete in service provision could be established.

Third, introducing diversified financing instruments and broadening urban infrastructure financing channels. Currently, urban infrastructure development relies heavily on land-secured loans and debt instruments. Without being able to attract sufficient private capital, urban infrastructure development is impeded by the often large-scale, long-cycle and low-returns projects. To attract private investments, the "public-private partnership" (PPP) model should be developed, the tender system for urban infrastructure projects unified, and build-operate-transfer (BOT), build-own-operate (BOO) and build-transfer-operate (BTO) models improved. Existing urban infrastructure that generates a steady income stream can be used as underlying asset for securitisation and sold to investors to achieve the dual goals of financing and vitalising the assets.

Fourth, implementing strict financing discipline, and establishing a robust and regulated local debt management system. Although our Budget Law prohibits local governments from incurring debt, local governments continue to borrow substantially through their local government financing vehicles at high-costs and in unregulated and non-transparent ways. Without effective risk prevention, local governments become reactive and their debt management system uncontrollable. Such loopholes should be plugged by amending the Budget Law to allow for legal borrowing by local governments, so that borrowing is regulated and subject to strict discipline. Fiscal restrictions should also be put into place with an open and transparent budget management system. Local governments should prepare and disclose their balance sheets, and be subject to supervision by the local people's congresses and taxpayers. Local governments should also be rated by independent third-party rating agencies so that their fiscal health could be assessed based on their economic fundamentals, budget structure, debt burden and solvency. This will help create a mechanism for determining the cost of borrowing based on their risk profile. In addition, administrative measures can be adopted to regulate local government debt such as setting up debt management agencies in the relevant central government departments, setting an annual limit for increasing debt for local governments, and establishing a risk warning mechanism. In case of insolvencies, the debt management agency can be mandated to deploy special personnel to temporarily take over the local government's fiscal power and resolve the problem by imposing spending cuts, public sector layoffs and debt restructuring.

(4) Establishing a green growth mechanism to promote low-carbon development and urban liveability.

First, leveraging both the market mechanism and government regulations to create a green mechanism for urban governance. Failure to control urban pollution is due to the absence or flaws of market mechanism and lack of government regulation. To promote low-carbon urban development, the government must improve the market mechanism for resource allocation. The mechanism could include proper incentives and constraints to optimise allocation of scarce resources and to promote the development and deployment of energy-efficient and emission-reducing technologies. On the other hand, the administrative practice should embrace new ideas and effectively coordinate regulatory supervision at different stages of production using life-cycle thinking to minimise pollution; sound urban planning and the relevant industrial, fiscal and taxation and financial policies are also required to help channel the flow of factors of production toward green and low-carbon areas.

Second, using price levers to build an efficient urban resource and energy system. Currently, the pricing mechanism of resources does not reflect their scarcity, market supply and demand, and the ecological and environmental costs. Therefore, the government must improve the pricing mechanism of resources such as coal, oil, gas, metals and ore and water, and explore the possibility of introducing market mechanisms for water rights and pollution rights. An environmental tax system should also be created, so as to collect a single tax with multiple taxable items and at different points. Low-carbon and clean energy sources such as wind, solar and biomass should increasingly take up a larger share in the national energy mix so as to optimise the energy supply system. Gains from the pricing mechanism and tax reform should be used to develop resource-saving technology, clean up ecological and environmental pollution, and compensate low-income earners and resource-exporting regions.

Third, promoting green living and green travel, and building a low-carbon urban operation system. Buildings and transportation are the two important and fast-growing consumers of urban energy. They are also the main culprits for the high energy consumption and serious pollution in Chinese cities. Energy consumption of new buildings should be strictly controlled by implementing energy efficiency design codes and green building rating and labelling systems. In addition, existing buildings should be retrofitted for better energy efficiency, public buildings could enter into energy management contracts to reduce energy consumption, and buildings with heating systems in northern China should be upgraded to save energy. Energy management should be improved in key areas, such as regulating the energy consumption of public buildings during the design, construction, operation and demolition stages. Distributed energy systems should be developed specially for indoors, buildings and industrial parks. To focus efforts and for efficiency, urban development should advance along the transport axis to form compact urban spaces. Development of urban rail transit and intercity railways should be accelerated to augment the supply of public transport. City roads should be redesigned to include special tracks for non-motorised vehicles to form a multi-modal urban transport system. In addition, vehicle standards should impose stricter requirements on fuel efficiency to promote use of low-emission vehicles such as hybrid and electric cars.

Fourth, protecting and cleaning up the urban environment to improve liveability. China has a fragile urban ecosystem which seriously affects the liveability of its cities. Building water-efficient cities and implementing a stringent water management system could help strengthen the ecosystem. The authorities should require strict observance of the water resource evaluation system (WRES) during urban planning and construction, and pollution controls and effective waste water treatment should be relied upon to protect and restore the urban water ecosystem. Building eco-cities, adhering to scientific rigour when planning for urban industries, and developing a circular economy are also important steps towards creating a liveable urban environment. Additional measures could include building environmentally-friendly infrastructure, comprehensive prevention and control of urban pollution, and developing an effective environmental accountability mechanism. Urban safety could also be improved by enhancing capacity in preventing and managing disasters such as floods, drought, earthquakes and fire, and in strengthening disaster preparedness and response and accountability mechanisms to build a safe and efficient urban infrastructure system and disaster-preparedness system.

(5) Strengthening urban and rural planning and management, and creating and improving the governance system that allows for public participation.

First, improving the planning regime, and increasing the scientific rigour and authority in urban-rural planning. China's lack of innovation, consistency, supervision and coherence in urban-rural planning has affected urbanisation. Going forward, the authorities will have to introduce more innovative concepts, balance socio-economic development with environment protection, and use modern technology to develop scientifically-sound urban-rural development plans. The spatial layout of urban and rural areas should be better-planned, in that it should rationally demarcate which are the prohibited, restricted and suitable development zones. At the city level, urban planning should adopt a "four-line" strategy — using blue, green, purple and yellow lines to delineate respectively the water bodies, urban greens, historical and cultural areas and municipal facilities. Low-carbon planning should be people-oriented, and should specify the targets for total greenhouse gas emissions within a planning region and for total emissions from urban development. The master plan should focus on dealing with the major strategic issues of urban development to shorten the approval period and improve on the timeliness. The detailed planning process should increase transparency and public participation, such that the detailed plans should be revised based on public input, so as to improve the plan's rigour and authority. Planning should include short-term objectives and a system for evaluating plan execution. The rate of progress of implementation should be determined so as to ensure that implementation of the plan is on track. The different plans should be better integrated and coordinated, such that the socio-economic development plans, urban-rural development plans, land use plans and environmental protection plans are implemented at the city and county levels. The Guidelines for Formulating Urban and Rural Plans (*Cheng Xiang Gui Hua Fa*) should be revised as soon as possible, based on the legislative principles of the Urban and Rural Planning Law.

Second, improving the urban and rural spatial layout to form a well-connected city network. What is currently lacking is the functional division between Chinese cities. Such deficiencies minimise the agglomeration effects. City clusters should be built around well-connected transportation hubs and corridors, and their functions and development objectives clearly defined. Coordinating agencies should be established for city clusters to facilitate their development and allow the benefits of urban clusters to spill over into the surrounding areas. The functions of central cities should be

improved, such that different central cities could develop in different ways, and are better able to stimulate development of the surrounding regions. Urban development must be based on unified planning and management, and the various functions reasonably defined and supporting facilities developed. The quantity and quality of urban public facilities and services should be determined based on the scientific analysis of total urban population growth, and infrastructure in counties and major towns should be improved to support industrial development and population growth.

Third, recalibrating the criteria for designating cities, and empowering city governments equally. Under the current hierarchical city administration system in China, resources are increasingly concentrated in higher-tier cities and central cities. As a result, big cities are overwhelmed with functions while smaller cities are lethargic, a phenomenon that disfavours coordinated development of cities of different sizes. Therefore, the criteria for designating cities should be recalibrated based on the level of economic development, population concentration and the new dynamics and trends relating to social governance. Towns with good industrial foundation, high population density, big migrant population and large environmental capacity should be designated as cities; and cities with special functions should be set up to preserve special resources, maintain stability in border regions and promote international cooperation.

Promoting public participation and improving the systems and mechanisms for urban governance. The lack of transparency in China's urban governance does not correspond with the public's diversified demands and overwhelming desire to participate in decision-making on aspects of urban development. Thus, the population register system should be improved to enable management of the population based on the place of residence, and ensure that public services, transfer payments, resource allocation and democratic elections apply to all permanent residents. Public participation should be community-based, and participation in public affairs by the people should be increased, with clearly defined responsibilities, rights and procedures, and the percentage of explicit public consent for important matters. Development of smart cities must be strengthened. Also important is the development of a unified information platform as well as intelligent management and operation systems that are measurable and can be visualised and dynamically adjusted to give greater attention to details in urban management.

Building synergy for robust urbanisation. Urbanisation is a profound process of social transformation that spans multiple areas and involves complex interests. On the one hand, it needs initiative; on the other hand, it requires observing a certain order. China should pursue reform constantly, review the lessons learnt, and galvanise broad-based support for a robust process of urbanisation. The key priority areas are as follows:

(1) Setting reform priorities. The reform agenda of urbanisation comprises closely-linked items that are integral to the entire process and that should be well-coordinated. Urbanisation also requires determination of reform priorities, depending on the different tasks at different stages. In the short to medium term, the priorities should be: (i) Removing the *hukou* restrictions in cities of medium size or below; (ii) Establishing a national basic social security package; (iii) Completing validation and certification of land rights; (iv) Reforming the land acquisition system to allow collective development land equal access to the non-agricultural land market; (v) Increasing the transparency of the local government's financing activities; (vi) Developing multiple financing channels for urban construction and development; (vii) Completing the price reform of resource-based products; and (viii) Recalibrating the criteria of designating cities. In the long-term, reforms pertinent to urbanisation should be carried out across the board, so as to create institutions and mechanisms that are conducive to free flow of factors of production, equal access to public services, a pleasant environment and social harmony and stability.

(2) Conducting pilot programmes. Urbanisation is a tedious and complex endeavour accompanied by many risk factors and high uncertainty. Policy errors could result in serious consequences. Therefore, pilot programmes are needed to validate ideas and accumulate experience before replication and scaling up. The pilot areas selected should ensure diversity in terms of location, scale and economic fundamentals, and the piloted policies should be specific and be designed and executed jointly by the central and local governments. Systemic reform should be carried out in pilot areas.

(3) Leveraging the central and local governments. Robust urbanisation requires top-down policy design. The central government should coordinate all the important initiatives in the overarching urbanisation process by following through the national development strategies, delivering the national policy intent, and eliminating institutional barriers that impede the flow of resources across provincial-level administrative boundaries. The people's creativity should be respected and recognised;

therefore, the different localities should be encouraged to explore distinctive urbanisation models that best suit their particularities, development stage and support structure.

(4) Improving the evaluation and supervision system. Given China's particularities, a scientifically rigorous evaluation system will help guide urbanisation towards a healthy path. China needs to institute a people-based evaluation metrics system that reflects the true level and quality of urbanisation. Supervision and accountability should also be strengthened to ensure economic efficiency, social inclusion and environmental sustainability. The system should also include an incentive and discipline mechanism that is aligned with the new urbanisation approach.

(5) Improving the urbanisation statistical indicator system. Comprehensive and accurate statistics are essential for scientifically evaluating the relative urbanisation performance of different locations. Urban boundaries should be better demarcated and urban population statistics improved. An information platform should be created to collate, process and manage information pertaining to urban public services, infrastructure, demographics, and environmental governance capacity.

Singapore's Experience in Urbanisation

KHOO Teng Chye

Introduction

Singapore is a densely populated city-state, with more than 5.4 million inhabitants living on 718.3 km^2 of land. In liveable city surveys over the past few years, including Mercer's Quality of Living Survey of 2014, Singapore has been rated one of the few high-density cities able to achieve high liveability standards.

Today, many of the cities considered to be highly liveable exist in large geographical spaces with low-rise developments, low population densities and low-polluting industries. Cities such as Sydney and Vancouver are often cited in this regard. Singapore, however, is one of the outliers, combining highly dense urban structures with high standards of living. Singapore represents an approach to sustainable urban development where high-density living does not necessarily have to lead to a compromise on the quality of life.

Yet, back in the 1960s, it would have been hard to imagine that Singapore — then a fledging nation troubled by high unemployment, urban slums, poor infrastructure, lack of sanitation, and an unskilled labour force — would make the leap from a developing nation to a thriving global city-state in the space of 40 years, let alone be considered one of the world's liveable cities. It had a population of about 1.7 million people then, less than one-third of today's 5.4 million.

The cities of tomorrow are likely to be resource-scarce, densely-populated and largely located in the regions of Asia, Latin America and Africa. Therefore, many other countries have found Singapore's experience interesting. They have attempted to understand how Singapore has been transformed, and how the experience can be replicated in their own countries. Singapore's model of balanced urban development, good governance and long-term planning provides a useful reference for other countries, in creating liveable cities in a high-density built environment.

Singapore's experience

In 2008, the Centre for Liveable Cities (CLC) was established to capture the explicit and tacit knowledge underlying Singapore's unique urban development experience, and to distil some of the general principles that have guided Singapore's urban planners and policy-makers over the years. CLC's research has included over 150 original interviews with past and present Cabinet ministers and senior officials, several of whom are quoted in this article. Through research, CLC found that Singapore has produced three key outcomes in its pursuit of liveable urban development:

(i) A **competitive economy** in order to attract investments and provide jobs;

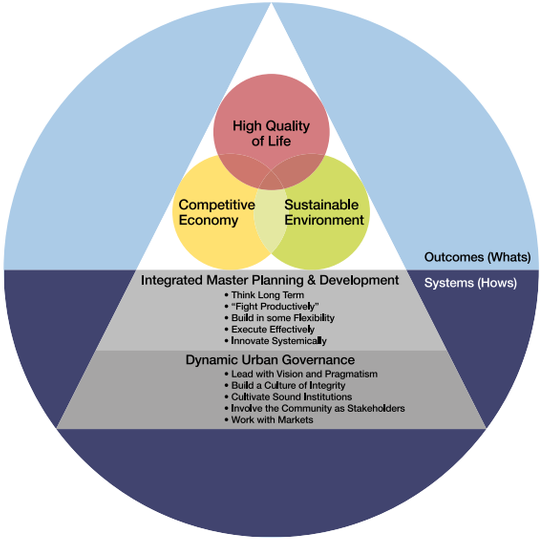
(ii) A **sustainable environment** because the city has to survive with limited natural resources, especially in land and water; and

(iii) A **high quality of life**, including the social and psychological well-being of the population.

In addition to these three outcomes, two elements have been vital to successful urbanisation in Singapore. First, it was crucial to have a **system of integrated master planning and development** that kept the outcomes of a liveable city constantly in view, over the long term.

Second, subscribing to an **urban governance approach that was dynamic** helped sustain the conditions needed for a thriving liveable city.

Together, these elements form the components of the **CLC Liveability Framework.**[1]



The CLC Liveability Framework.
Source: Centre for Liveable Cities (CLC)

[1] A preliminary and condensed version of the CLC Framework by Khoo Teng Chye was published in the CLC magazine *Urban Solutions* No. 1 (July 2012).

The liveable city outcomes

In 1992, the United Nations Conference on Environment and Development (UNCED) posited that the social, environmental and economic needs of a country must be met in balance with one another. It is worth noting that there are no absolute levels whereby liveability is met. Instead, the challenge is to optimise the trade-offs at each stage of growth. Hence, each city must take into account its own needs, resources and context when planning its development.

The philosophy behind the liveable city outcomes identified in the CLC Framework has nevertheless remained consistent for more than four decades of Singapore's urbanisation.

Outcome 1: **A competitive economy**

Singapore's competitive economy has contributed greatly to the city-state's liveability quotient. At the most basic level, residents need opportunities to make a living and achieve a degree of economic security. This is as true today as it was in the early days of development, when industrialisation helped squatters and rural residents transit to a modern urban economy.

Singapore's urban systems have had an integral role in supporting the country's economic development — a priority in its earliest years — from the purposeful allocation of land and facilities to the supply of utilities and a strong transport infrastructure with local and global connections, giving the economy a competitive edge over its regional neighbours.[2] In turn, a competitive economy has allowed the city-state to generate income to sustain itself, develop and create yet more opportunities for growth in a virtuous cycle.

With further development, a well-functioning economy and a liveable environment have become ever more important, since cities worldwide now compete for investment and mobile talent:

If the people are rooted to the place, that's how you can help ensure that there's a certain robustness to it and even for those who are foreigners... the liveability and vibrancy are important... To the extent that we can root them through clustering of knowledge and people and like-minded activities, we will do that.[3]

BEH SWAN GIN
Chairman, Economic Development Board

Outcome 2: **A sustainable environment**

Singapore committed to sustainable development early on, in order to preserve and make the most of what few natural resources it did have. Provisions for clean air, clean water and green cover were integral to city planning from the start. Careful thought was even given to wind patterns when the industrial estates were located in the west of Singapore, so that pollution from factories would not blow into the city. When the Japanese company Sumitomo wanted to build a petrochemical plant in the mid-1970s, pollution control requirements threatened to raise costs and deter the project:

But the Ministry of the Environment said: "No, we should not concede. It will pollute Singapore." This went to Cabinet and Cabinet agreed with the Ministry of the Environment. They said: "No, we insist." Then Sumitomo proceeded and put in the investments necessary.[4]

S. DHANABALAN
former Cabinet Minister

Environmental considerations have not been assumed to be at odds with economic development. Instead, they have been integrated into urban planning and embedded into a larger social and economic narrative by framing them as a means to distinguish Singapore from its regional peers. In the early years, a clean and green city was a way to show foreign investors that Singapore was a well-run country and thus a good and pleasant place to set up business.

Outcome 3: **A high quality of life**

The notion of a high quality of life encompasses many aspects of urban living, including the economic, social, environmental and psychological.

[2] Lee Kuan Yew, interview by the Centre for Liveable Cities, Singapore, 31 August 2012. Lee was Singapore's first Prime Minister, from 1959 to 1990. An edited version of the interview transcript was published in *Urban Solutions* No. 2 (February 2013).

[3] Beh Swan Gin, interview by the Centre for Liveable Cities, Singapore, 21 February 2012. Beh was then Managing Director of the Economic Development Board (EDB). He is currently EDB's Chairman.
[4] S. Dhanabalan, interview by the Centre for Liveable Cities, Singapore, 20 December 2011. Dhanabalan was former Chairman of Temasek Holdings (Pte) Ltd. He held previous appointments as Minister for Foreign Affairs, Minister for Culture, Minister for Community Development, Minister for National Development, and Minister for Trade and Industry.

One of Singapore's key attractions today is its pleasant and well-planned environment — a far cry from the early days of slums, squalor and crime. Indeed, apart from the provision of amenities, creating a sense of personal security was an important aspect of developing Singapore's new towns:

Create a sense of safety... It is no use having good surroundings, if you are afraid all the time... We have Neighbourhood Police Posts — police who know the people in that neighbourhood, so they know when strangers come in.[5]

LEE KUAN YEW
former Prime Minister

Retaining a sense of engagement in the physical landscape has since become a way to encourage Singaporeans to feel connected to the land. Since the mid-1980s, city planning in Singapore has also tried to give more emphasis to the character and soul of the city-state, one that encompasses culture, identity and aesthetics.

Balancing the three liveability outcomes

These three liveable city outcomes are linked directly to Singapore's outcome indicators at the national level. They are published in the Ministry of Finance's Revenue and Expenditure Estimates for each financial year, ensuring that all government agencies know the big picture of the overall state of urban development. It also signals to the public that the Government is committed to, and serious about, making Singapore liveable.

Developing a liveable Singapore involves balancing the three interdependent (and often overlapping) outcomes. Focusing too much on one at the expense of the others could easily lead to undesirable outcomes. The outcomes are also not always so discrete: solutions to achieve one outcome could create opportunities towards another.

For instance, Singapore's quest for water self-sufficiency has given rise to a niche sector of specialised companies that provided services related to water reclamation and desalination. With further investment by the Government, this nascent water sector is now expected to provide 11,000 jobs and add S$1.7 billion to the economy by 2015.

Taken together, these three outcomes inform Singapore's planning and development regime.

[5] Lee Kuan Yew, interview by the Centre for Liveable Cities, Singapore, 31 August 2012.

Integrated master planning: *implicit principles*

Singapore's integrated master planning system has enabled the Government to create and manage urban systems that balance the different guiding priorities on both short- and long-term scales, in response to changes in a dynamic political, economic and social environment. A key differentiating factor for Singapore's planning regime is that its plans do not just stay on paper — they are implemented and executed through dedicated organisations, with expertise and resources. Five implicit principles underpin Singapore's integrated master planning approach:

Principle 1: **Think long-term**

At the heart of the integrated master planning approach is Singapore's overarching Concept Plan, covering the country's land use over a time horizon of up to 50 years. The plan, created through an inter-agency effort, ensures that all key land use requirements for the city are met and that individual urban systems, such as transport, water or public housing, do not work in isolation.

Taking a long-term view has been important in two other ways. First, it has helped officials keep the three liveability outcomes in balance, at both the planning and implementing stages. Second, taking a long-term view has helped the Government identify problems in the future, making it expedient to start taking steps early to pre-empt the problem, or to develop a good project ahead of time. In the early decades of Singapore's rapid growth, even longer planning timeframes were needed:

[We made] a decision to project to 'Year X' which was 100 years. Why? Because I said to myself that if we don't do that, we will certainly run out of land. [We may] build to too low a density when you project for the short-term. And then we run out of space.[6]

LIU THAI KER
Chairman, Centre for Liveable Cities and former CEO, Housing and Development Board and Urban Redevelopment Authority

[6] Liu Thai Ker, interview by the Centre for Liveable Cities, Singapore, 16 September 2011. Liu is currently also Director of RSP Architects Planners & Engineers (Pte) Ltd.

Principle 2: **Fight productively**

Left to their own devices, each government agency would focus on its own targets rather than the goals of the government as a whole. In order to facilitate integrated planning, an inter-agency structure is needed to encourage agencies to acknowledge one another's different concerns and goals. In Singapore, such a structure has nurtured an environment in which officials learn to have *fights* that are productive and which generate critical thinking, based on rational thinking and analyses. Before Singapore's Mass Rapid Transit (MRT) system was approved, former Deputy Prime Minister Goh Keng Swee encouraged a rigorous, decade-long debate on the alternatives:

[Goh Keng Swee] objected to the MRT because the case for having the MRT was that "you have no alternative"... That's not to say he objected to the MRT but he objected to the logic, which is not a frivolous matter. He objected to people who don't think deeply enough and argue deeply enough. That was what he was after.[7]

LIM SIONG GUAN
former Head of Civil Service

These robust discussions, while sometimes heated, have eventually led to better collective decisions on planning and implementation. Trade-offs made among the three liveability outcomes are then better understood by all parties and appropriately managed. Such *productive fights* within the government have been supported by a Cabinet that is collaborative, with diverse experience across different portfolios, serving as the final conflict arbitrator.

Principle 3: **Build-in some flexibility**

Singapore's city planners accept that no plan is perfect, as the future is ultimately unpredictable. Consequently, the Concept Plan has been periodically reviewed in the light of changing conditions, such as shifts in the economic or social environment:

Sungei Buloh Wetland Reserve. While previously intended to be developed as an agricultural science and technology park, the government decided to preserve the wetland area, protecting a diversity of plants and animals.
Source: Singapore National Parks Board (NParks)

We cannot be so rigid that what was planned has to be executed without any adjustment. We can't. If so, then there [would have been] no business parks. If so, there is no 'One-North'.[8]

TAN CHIN NAM
former Managing Director, Economic Development Board

The government has also been open to changing the schedule or form of certain developments slated in the Master Plan. For instance, Sungei Buloh, slated to become an agro-technology park, was instead turned into a wetland reserve in 1989, given that there was no pressing need for the area to be developed.[9]

[7] Lim Siong Guan, interview by the Centre for Liveable Cities, Singapore, 26 November 2012. Lim is currently Group President of GIC Pte Ltd. He held previous appointments as Head of Civil Service, and Permanent Secretary at the Ministry of Finance and the Prime Minister's Office; he was also Chairman of the Economic Development Board, among other posts.

[8] Tan Chin Nam, interview by the Centre for Liveable Cities, Singapore, 21 February 2012. Tan is currently Chairman of Temasek Management Services, and a member of the CLC Advisory Board. He has held previous public sector appointments, including Managing Director of the Economic Development Board and Permanent Secretary in various Ministries.
"One-North" refers to a cluster of world-class research facilities and business park space, built to support the growth of biomedical sciences, physical sciences, infocomm technology (ICT), media and engineering.

[9] S. Dhanabalan, interview by the Centre for Liveable Cities, Singapore, 20 December 2011.

Some other land parcels are also reserved for future use and zoned in a way that gives developers some leeway in the land use mix, a concept known as "white sites": the Marina Bay area[10] is a prominent example.

Principle 4: **Execute effectively**

A plan is only as good as its successful implementation. In Singapore, the coordinated efforts of the operational agencies set up to implement policies and programmes have been key.

One important element of effective execution is the careful preparation that takes place before implementation, including extensive research into the situation at hand. This was the case when Singapore first introduced its "new town" concept:

I spent more than half a year to define what was a new town... We wanted the new town to be highly self-sufficient, as highly self-sufficient as a new town can afford. So I interviewed a lot of people... all kinds of people, industries and so on... Basically the question is how many people do you need to sustain an emporium, to sustain a supermarket, to sustain a polyclinic etc. And the number came to 250,000.[11]

LIU THAI KER
Chairman, Centre for Liveable Cities and former CEO, Housing and Development Board and Urban Redevelopment Authority

Executing a plan is also not just about completing the project but giving careful consideration to the maintenance of what has been built. For instance, the upkeep and upgrading of existing sewage systems in Singapore has proven much more cost-effective than digging up and replacing the old structures.

Principle 5: **Innovate systemically**

Urban development will always face resource limits, whether natural, physical or financial. However, innovation can mitigate these limits and, in some cases, overcome them in the long term. Solving Singapore's urban problems has required officials to be able to see different possibilities beyond the conventional wisdom; in some cases, they have had to dare to dream big: Singapore's Deep Tunnel Sewerage System[12], and Semakau landfill (which is environmentally-conscious and is now visited by nature lovers), are notable examples.

Innovation can also come in the form of policies. In 1998, Singapore became the first country to introduce an electronic road pricing system to manage traffic congestion; in 2000, it implemented a marginal cost-pricing system for water. These bold policies have been attributed to the "high level of administrative innovation" present in the Government.[13]

Dynamic urban governance

The best intentions in planning amount to nothing if a city's urban governance system — or lack of one — does not allow good plans to be crafted and realised. Sound urban governance creates the right conditions for a city to achieve its liveable city outcomes.

Singapore's urban governance has been distinguished by its efficient provision of basic services to citizens and the establishment of competent institutions for development and coordination. Its geographical scale and structure of government has allowed for efficiency in policy formation and implementation, and the country has been able to achieve economic and institutional development. At the same time, Singapore's size and lack of resources has made it perennially vulnerable to changes in the external political and economic environment.

In this context, Singapore had to evolve an urban governance approach that is dynamic: allowing its leaders to make optimal decisions and choices in an unpredictable, complex and constantly changing environment as well as helping society develop the capacity to deal with challenging situations.

Of the many elements informing Singapore's approach to dynamic urban governance, five have stood out as key principles:

[10] John Keung, interview by the Centre for Liveable Cities, Singapore, 27 July 2011. Keung, who is currently Chief Executive Officer of the Building and Construction Authority (BCA), among other appointments, has held other senior planning posts in Singapore's urban development agencies, such as Deputy CEO (Building) of the Housing and Development Board.
[11] Liu Thai Ker, interview by the Centre for Liveable Cities, Singapore, 16 September 2011.

[12] The Deep Tunnel Sewerage System (DTSS) is conceptualised and managed by the PUB, Singapore's national water agency. It will process Singapore's used water collection, treatment, reclamation and disposal through deep tunnel pipes. For full information, visit http://www.pub.gov.sg/dtss/Pages/default.aspx
[13] Lim Hng Kiang, interview by the Centre for Liveable Cities, Singapore, 13 April 2012. Lim, who is currently Minister for Trade and Industry (Trade), was previously Minister for National Development.

Parliament House of Singapore, where decisions concerning national development are frequently debated and made.

Source: edwin.11 (Flickr CC)

Principle 1: **Lead with vision and pragmatism**

How **leadership** is exercised both at the political and bureaucratic levels has had an important impact on planning and implementation. A leadership with vision, and the **political will** to realise it, has been critical for Singapore's development. Of particular importance was the political will to push through policies or projects that were considered unpopular or politically difficult at the time, but which were for the long-term benefit of the country and its people. For instance, the Government's spate of land acquisitions from the late 1960s was regarded as somewhat draconian, but was nevertheless deemed necessary for Singapore's subsequent development:

If you go back and think of some of the things that were done... How land acquisitions were carried out in those days cannot be done today. But it had to be done in those days... [What is required is] a strong political will and a population that recognises that this has to be done.[14]

MAH BOW TAN
former Cabinet Minister

[14] Mah Bow Tan, interview by the Centre for Liveable Cities, Singapore, 30 November 2011. Mah was former Minister for National Development, and also held previous appointments as Minister for Communications and Minister for the Environment.

Principle 2: **Build a culture of integrity**

Since Singapore's independence, a culture of **integrity** has been enforced by governance systems that stress the importance of accountability, transparency and incorruptibility. This culture of integrity has affected how Singapore's public officers, as well as politicians, carry out their responsibilities, earning them a high degree of credibility and legitimacy:

You must have the governance right. Once you have corruption, bad administration, fickle decision-making, which can be influenced by friendship or favours or bribes, then you've got a problem.[15]

LEE KUAN YEW
former Prime Minister

The government has taken pains to inculcate a sense of **accountability** in public officers. City planners are responsible for large infrastructure projects that shape the city and the daily lives of citizens, from the roads used, to the roofs over their heads. The Government has had to ensure that sound financing mechanisms are put in place to maintain fiscal solvency and the sustainability of the projects:

We are very proud of the fact that we don't borrow money. Not even for development. This leads to very, very tight rules on budgeting, which is good. You can say it is good for budget discipline.... in Singapore, we kept ourselves bound to what we are able to earn, and pay for everything.[16]

LIM SIONG GUAN
former Head of Civil Service

Principle 3: **Cultivate sound institutions**

Strong institutions with **well thought-out systems and processes** contribute to better decision-making, leading to more effective planning and development. Singapore's approach has been to use a range of structures (both formal and informal) in planning, and to allow these structures to evolve as the situation requires. Aside from formal institutions, less formal **norms of governance** have also been important, such as a rational approach to policy, respect for sound professional competence and meritocracy.

[15] Lee Kuan Yew, interview by Asit Biswas and Cecilia Tortajada, 11 February 2009.
[16] Lim Siong Guan, interview by the Centre for Liveable Cities, Singapore, 26 November 2012.

Professionalism is an important feature in Singapore's public institutions. Many professional bureaucrats are technical experts as well as strategists, well able to defend their ideas when necessary.

The separation of politics and the professional services, as embodied in Singapore's institutions, is another significant norm. While politicians focus on strategy and policy, the professional and technical issues are handled by the agencies, which ultimately lead to greater accountability and effectiveness. At the same time, mutual respect between the political leadership and the bureaucracy contribute to better decisions and clarity of action and responsibility. This was evident, for instance, in the decade-long clean-up of the Singapore River, beginning in 1977:

The technical engineering problems, we deal with, we don't get interference from Members of Parliament, politicians saying: "Why don't you do this?" They don't tell us how to clean up. We deal with that part. But the social and political problems, being the elected government and [having] practically all the seats in Parliament, they had the political will and political muscle to carry though all these things.[17]

LEE EK TIENG
former Head of Civil Service

Institutional rules and norms, both formal and informal, have enabled government agencies to work effectively together, irrespective of different or competing interests or professional opinions.

Principle 4: **Involve the community as stakeholders**

Creating a liveable city is a huge and complex undertaking, and city planners need the support of the city's inhabitants for projects and policies to succeed and to be sustainable. No government has all the answers or inexhaustible resources. **Creating a stake in the city** for the community provides opportunities for the public, people and private sectors to work together for the long-term good of the city.

The Singapore Government has increasingly involved the community towards protecting the country's shared resources, as well as in the policy-forming process. While policy and planning decisions are fundamentally undertaken by the Government, **public engagement** enhances the legitimacy of decision-making and policy outcomes. When Chek Jawa, a biodiversity-rich area, was slated for development, the civil society organisation Nature Society (Singapore)[18] lobbied the Government to preserve the area. The result was a reprieve in 2002:

I feel that NParks and Nature Society worked very well together because of our improved relations... We did agree not to do too much confrontational fighting with the Government on Chek Jawa... The really important thing was that the public supported it, and other groups started up spontaneously to support it.[19]

GEH MIN
former President of Nature Society (Singapore)

When the Government and key community stakeholders work together for the greater public good, the result is a collective win for the country.

Principle 5: **Work with markets**

A key governance principle, and a fiscally prudent approach, has been to **harness market forces** to improve efficiency.

The private sector has played a part in the provision of services which the Government alone could not provide, or services which the Government wanted to relinquish in order to re-direct public funds to different priorities. The Government has also successfully privatised power generation and some parts of public transportation. This approach has enabled the Government to implement a wide range of programmes more effectively.

Nevertheless, there are limits to private sector involvement in the provision of public services. The Government has had to be clear about the kind of services that cannot be outsourced or privatised, given the overall role and responsibility of government. In the case of Surbana Corporation Pte Ltd, which used to be HDB's Building and Development Division and is now an international building consultancy, the issue of maintaining control was clear:

[17] Lee Ek Tieng and Tan Gee Paw, interview by Asit Biswas and Cecilia Tortajada, Singapore, 9 February 2011. Lee was previously Head of Singapore's Civil Service.

[18] The Nature Society (Singapore) is dedicated to the appreciation, conservation, study and enjoyment of the natural heritage in Singapore, Malaysia and the surrounding region. It was formerly the Singapore branch of the Malayan Nature Society, formed in 1954, and became Nature Society (Singapore) in 1991.
[19] Geh Min, interview by the Centre for Liveable Cities, Singapore, 14 March 2012. Geh was also a board member of The Nature Conservancy's Asia Pacific Council and the Singapore Environment Council. She was a Nominated Member of Parliament from 2005 to 2006.

Punggol Master Plan, revealing the town as the "Venice of Punggol".
Source: Housing and Development Board (HDB)

Punggol Waterway. As of today, Punggol Waterway has become a vibrant sports and recreation location for the residents.
Source: Housing and Development Board (HDB)

Surbana is a good positive example where the expertise we have garnered by building public housing in Singapore can now be applied elsewhere. We can sell these services but we still have to be clear that Surbana should still be controlled by us [Temasek Holdings, the Singapore government's investment vehicle] because they have a big role to play in Singapore.[20]

S. DHANABALAN
former Cabinet Minister

CLC framework in local practice: *Punggol Town*

Singapore's urban landscape is still evolving. New towns or districts emerge in response to the changing needs in the city's development. One good example is Punggol Town. It was once a fishing village with many pig and poultry farms, located in the northeastern part of Singapore, with a total area of 9.57 km^2, 155 ha of land reclaimed from the sea.

In 1996, Singapore's then Prime Minister Goh Chok Tong announced in his National Day Rally that the Government would develop Punggol into a 21st-century model town, known as "Punggol 21".

Punggol Town is built on Singapore's experience and serves as an urban living laboratory as Singapore continues to develop and experiment with further enhanced living environment. The vision for Punggol is to be "The Sustainable Waterfront Town in the Tropics". [21]

Integrated long-term planning

Integrated planning is crucial to Punggol's development. The Housing and Development Board (HDB), Urban Redevelopment Authority (URA), National Parks Board (NParks), Public Utilities Board (PUB), Land Transport Authority (LTA), and other agencies have come together and worked hand-in-hand in preparing and executing the "Punggol 21" vision. Such long-term integrated planning approach is well illustrated in the creation of the Punggol Waterway. It started off as a pipeline connecting Punggol Reservoir on one side and Serangoon Reservoir on the other side, that provided water for the residents and balanced the volume of water flow in both reservoirs. When the plans went to then-Minister for National Development Mah Bow Tan, he disagreed with the idea of building a pipeline. Instead, he suggested building a beautiful waterway with attractive amenities and greenery that

[20] S. Dhanabalan, interview by the Centre for Liveable Cities, Singapore, 20 December 2011.
[21] HDB Annual Report 2008. Housing and Development Board. Singapore.

allowed for recreation and high-value waterfront housing deep within the town and away from the coast. It is now called the "Venice of Singapore".[22]

Build-in some flexibility

The initial "Punggol 21" vision was conceptualised in the 1990s. But the implementation of the plans was delayed for a few years due to the Asian financial crisis. After that, the plans were re-looked and improved. The "Punggol 21" was upgraded into "Punggol 21-Plus". The key feature of "Punggol 21-Plus" is Punggol Waterway as stated above. It became possible only because the land had been set aside to develop a pipeline in the original plan.

Lead with pragmatism

The constraints of land resource constantly compel Singapore to adopt a pragmatic approach in development. The vision of converting Punggol into a waterfront town was not created by accident. In the early 1990s, when Lim Chu Kang Dumping Ground became depleted and Lorong Halus Dumping Ground was projected to be exhausted by 2000, Punggol was initially identified as the next landfill to serve Singapore. However, the Government subsequently realised that Punggol can be used as a new housing estate instead, given the increasing housing demand in Singapore. That opened up a new window of opportunity and new chapter for Punggol's future development. [23]

Involve the community as stakeholders

The community was engaged in developing Punggol. HDB, National Environment Agency (NEA), the Public Service Division and People's Association (a statutory board providing community services and facilitating communications between the Government and the people) have worked on a joint project with Punggol residents to co-create the Punggol living experience. Called "Project Love Punggol", it aims to develop new ideas that will enable stronger community ownership by the residents of Punggol in their neighbourhood, community and environment.

The enthusiasm of the residents, and their readiness to take ownership to create a unique neighbourhood, are most heartening. For example, to help Punggol residents better visualise mobile apps and websites for their community, public officers created cardboard models of a smartphone and

[22] Speech by Prime Minister Lee Hsien Loong at the Opening of Punggol Waterway, 23 October 2011. at Punggol Waterway. http://www.pmo.gov.sg/content/pmosite/mediacentre/speechesninterviews/primeminister/2011/October/Speech_by_Prime_Minister_Lee_Hsien_Loong_at_the_Opening_of_Punggol_Waterway.html

[23] Tan Yong Soon, et al. (2009). Clean, Green and Blue: Singapore's journey towards environmental and water sustainability. ISEAS Publishing, Singapore.

Punggol Waterfront Promenade. The Punggol Waterfront Trail has become increasingly popular among the residents, emerging as one of the top attraction of the park.
Source: Housing and Development Board (HDB)

laptop. Sheets of paper representing features of the apps and websites are attached to the models. Residents can then "modify" the features easily on the spot. The prototyping and testing process is repeated until a final solution is reached. Another example of engaging the community is that "My Waterway@Punggol" is a name chosen by residents.[24]

Work with stakeholders

The majority of the housing stock in Punggol is public housing. However, the private sector also plays a key role in developing Punggol. Private developers are invited to develop private housing and executive condominiums through URA's land sales, which provide a better housing mix in Punggol.

Today, when you step into Punggol, you will find it a vibrant town with a wide variety of high-quality high-density housing options. It is well-connected to the rest of Singapore and has good connections within the town itself. Residents in Punggol enjoy sizeable parks, commercial centres, community spaces and waterfront promenades, all within cycling or walking distances. Social memories are retained and a unique character of Punggol is developing, which the residents of Punggol can call home. It becomes one of the most sought-after housing locations and one of the largest HDB towns in Singapore.

[24] Speech by Prime Minister Lee Hsien Loong at the Opening of Punggol Waterway, 23 October 2011. http://www.pmo.gov.sg/content/pmosite/mediacentre/speechesninterviews/primeminister/2011/October/Speech_by_Prime_Minister_Lee_Hsien_Loong_at_the_Opening_of_Punggol_Waterway.html

CLC framework in global practice: *China*

Beyond the shores of Singapore, Singapore's urban development experience has also been applied to the development of liveable cities abroad. Singapore's experience abroad has further demonstrated that, when the overarching principles of the framework are put in practice to guide the development of cities, it helps to build an effective governance structure capable of navigating the complex challenges that come with urbanisation.

This is most evident in the government-to-government collaborative city development efforts between Singapore and China at the Suzhou Industrial Park (SIP) and Sino-Singapore Tianjin Eco-City (SSTEC).

The Panorama of Jinji Lake.

Source: China—Singapore Suzhou Industrial Park Development Group Co. Ltd (CSSD)

Suzhou Industrial Park

In 1994, Singapore embarked on a project to develop the SIP with China. The development of SIP was carried out on a commercial basis with the intention of facilitating the transfer of Singapore's public administration "software" to the project. The Suzhou Municipal Government announced that what was once low-lying agricultural land in Suzhou would become the new Central Business District (CBD) of Suzhou city by 2006. The eastern part of Suzhou city, where SIP was located, was identified for the future development of Suzhou.

Long-term planning

A long-term perspective is integral to the development of SIP. SIP was planned as a modern township that would integrate well with the existing city and become an efficient and functional urban entity with a high-quality living and working environment. It was envisaged that the 70 Km^2 site would support a population of 600,000 and provide employment for 360,000 by 2020.

With this in mind, the master plan featured a well-organised urban layout. Commercial centres and residential neighbourhoods were surrounded by light clean industries to balance the resident population and employment opportunities, thus minimising travel. The valuable land parcel around Jinji Lake, which offers the best views in the SIP, was planned for commercial, residential and recreational uses. Key utilities such as sewage treatment plants were located away from major residential and commercial areas to protect their land values.

The master plan also reinforced economic incentives to attract foreign industrial, commercial, tourism and property investments to the project. A technology hub was planned to provide a quality environment for high-tech industries, business parks, research and development activities and quality housing for the local and expatriate workforce.

The long-term perspective was also reflected in the high requirements for landfilling that were set right at the beginning. SIP was previously low-lying agricultural land, which could be completely flooded when it rained. Looking beyond short-term gains, the land was raised to a level that could withstand floods for the next 100 years. In 1995, SIP was spared the impact of record rainfall which hit Suzhou and affected the surrounding areas.

Build-in some flexibility

The policies of SIP constantly evolved in accordance with external changes and internal needs and priorities. The systems in place were also designed in such a way that they could readily respond and adapt to unforeseen developments, ensuring that SIP would always remain liveable. The Central Provident Fund (CPF) was one such example.

Singapore's comprehensive social security saving scheme, known as the Central Provident Fund (CPF), was adapted for use in 1997. It functioned as an individual savings account which each individual could decide on its use. Both the employee and employer would contribute a fixed percentage of income to the employee's individual provident fund account, which allowed individuals to finance their housing in SIP, thus also promoting home ownership.[25]

However, due to a nationwide change in social security policy in 2010, individuals could no longer withdraw a portion of their CPF funds and decide on its use. To protect their interest, the Suzhou Industrial Park Administrative Committee (SIPAC), an independent local government authority empowered by the local government to oversee SIP's development, formulated an approach to phase in the new system, where existing mortgages and benefits of individuals under the old scheme would not be affected. New individuals would then be placed under the new scheme.

Lead with pragmatism

Limited financial resources compelled the China—Singapore Suzhou Industrial Park Development Group Co. Ltd (CSSD), the joint venture enterprise responsible for SIP's infrastructure development and marketing, to adopt a pragmatic approach to development. Strict financial discipline was observed throughout the process, which allowed the infrastructure of SIP be built in accordance with the financial capabilities of CSSD.

Faced with limited resources and high cost of building infrastructure in the 1970s, completing the road networks in one phase would place a great financial burden on CSSD. CSSD then decided to adopt the "just ahead of demand" principle, which meant that they would prioritise the building of the right pieces of infrastructure first. Roads were thus built in stages instead of in full width in one go. Some roads were built as two lanes before they were expanded to four lanes in later years as traffic volume increased.[26]

[25] Alexius A. Pereira, 2003, State Collaboration and Development Strategies in China: The case of the China–Singapore Suzhou Industrial Park (1992–2000)
[26] Interview with Khor Poh Hwa, 16 October 2013.

Sino-Singapore Tianjin Eco-City

As the second government-to-government project between China and Singapore, SSTEC was conceived in 2007 to serve as a model for sustainable development for other cities in China and the world. Targeted for completion within 15 to 20 years, the eco-city will have a projected targeted population of 350,000 residents when fully completed.

Integrated master planning

Integrated planning was essential in producing one cohesive master plan for SSTEC. To ensure this, the collaboration between China and Singapore went beyond funding and high-level commitment; working groups were formed horizontally at every level of government, from head of state to local levels, and "diagonally", where various Chinese agencies and corporations worked collaboratively with their Singapore counterparts.

The multi-tier collaboration structure paved the way for producing one cohesive master plan, as agencies for urban planning, water, environment, housing and transport from both countries worked together. The master plan principle, which was the outcome of this collaborative effort, can be summarised as "1 axis-3 centres-4 districts, 1 island-3 waters-6 corridors".

Execute effectively

To ensure that SSTEC would achieve its vision of becoming a model for sustainable development, extensive efforts were devoted to the design of the key performance indicator (KPI) framework for TEC, so that this could serve as a long-term governance tool for the development and management of the eco-city.

Within its KPI framework, SSTEC aimed to define what an eco-city entails, with a clear definition and integrated standard set in place. This was different from many other cities that have tried to establish themselves as "eco-cities". The framework articulates 26 KPIs to guide planning and construction. The KPIs cover environmental, social and economic aspects such as air and water quality, transportation, energy usage, green cover, waste management and the provision of public housing in the eco-city.

Sino–Singapore Tianjin Eco-city

Source: Sino-Singapore Tianjin Eco-city Investment and Development Co. Ltd (SSTEC)

The KPIs were jointly formulated by Singaporean and Chinese officials in accordance with several principles. It was agreed that the KPIs would be:

— scientific and practical;
— qualitative and quantitative;
— comparable yet customised;
— attainable and expandable.

During the selection process, national standards and distinctive ecological KPIs adopted in China and other parts of the world were chosen. Due consideration was also given to the local conditions at the Eco-city site. Related policies and goals set by Tianjin, the Tianjin Binhai New Area (TBNA), and other more advanced Chinese cities were also used as references. These were then integrated with the TEC's local conditions and subjected to scientific adjustments before they were finally determined in further consultation with experts.

TEC is lauded for its comprehensive key performance indicators (KPIs) which the World Bank assessed to be broader in scope compared with existing Chinese standards, as well as more advanced, particularly in the areas of carbon emissions, proportion of green buildings, proportion of green trips, renewable energy use, solid waste recycling, and use of non-conventional water resources.

Through Singapore's involvement in urban development abroad, the Republic continues to learn from experience and to bring back useful lessons for Singapore. These experiences demonstrate that the urban governance principles encapsulated through the CLC Liveability Framework are also relevant and applicable in other contexts outside Singapore.

Conclusion

Singapore has come a long way in its urbanisation journey. It took about one and a half centuries for Singapore to develop from a fishing village to an urbanised society. Most of the development took place after it gained independence in 1965.

The CLC Liveability Framework, providing a snapshot of key takeaways from Singapore's unique urban development experience, is not meant to be exhaustive. Instead, it seeks to outline general principles that underpin effective urban planning and governance, considering urbanisation issues from strategic, managerial and political perspectives, not just from purely technical ones.

This Framework might provide some useful insights for other cities interested in raising and sustaining liveability standards, as they consider the approaches best suited to their particular circumstances.

We learn what not to do by watching other cities and also what to do from watching good cities. There is nothing new that you can think of that has not been tried by thousands of other cities.[27]

LEE KUAN YEW
former Prime Minister

[27] Lee Kuan Yew, interview by the Centre for Liveable Cities, Singapore, 31 August 2012.

TWO

Urban Planning and Governance

China's Urban Planning System *Issues and Reform Path*

WEI Jianing and CHEN Jianguo

International experience shows that urban planning is one of the basic means and key approaches to promote the healthy development of urbanisation. After undergoing the "Soviet model" during the first 30 years from the founding of the new China, China's urban planning has seen a smooth transition at the beginning of the reform and opening up phase, and has ushered in "the second spring for the new China's urban planning and development"[1]. Thereafter, it played an irreplaceable role in Chinese urban construction. However, with the deepening of urbanisation, China has entered a new stage, with the urbanisation rate being over 50%, and the original urban planning system cannot adapt to the strategic requirements of the new urbanisation. In this area, there is a long way to go for China's future urban planning reform.

The development and achievements of urban planning in China

Since the establishment of People's Republic of China, through learning from the Soviet Union, China developed an urban planning system which corresponded to China's planned economic development in the early days. It played an important role in China's industrialisation. Over the past six decades, China's urban planning system has been updated according to the advancement in economic growth and social development.

Establishing a legal framework for urban planning. In 1979, Former National Construction Commission and National Urban Construction Bureau jointly drafted the "Urban Planning Ordinance" and it was approved by the State Council on 5 Jan, 1984. It marked the beginning of China's urban planning with statutory basis. In April 1990, "China's Urban Planning Act" was passed. China's urban planning legislation consists of Urban Planning Act, urban planning related and supporting laws, and directives. The enforcement of urban planning legislation shows that China's urban planning system is able to cover all the cities and rural areas under clear guidance. The planning system comprises city plans, town plans and village plans.[2]

Urban planning shifting from the emphasis on physical distribution to public policy orientation. Coupled with the transformation of China's urban governance, urban planning research has shifted from the angle of physical and spatial distribution to social benefits and public policies. In 2005, the Ministry of Construction[3] announced the Urban Planning Development Guidelines, which stipulate that "Urban planning is one of the most important public policies that the government should employ to allocate the distribution of natural resources, guide urban development and construction, maintain social justice, and protect public security and public interest."[4]

Urban planning changing from scattered plans to integrated ones. The drawbacks of scattered plans in China have been widely debated and known. Therefore, some of the Chinese provinces such as Hainan and Guangdong have piloted to integrate different plans including economic and social development plan, urban master plan and land use plan into one plan. Some of the Chinese cities have also embarked on reforming planning systems to coordinate economic and social development, land use, resources and environment, industrial development, population growth and urban development.[5]

Current practice and problems

Weak social function in urban planning. China's urban planning has been reduced to a technical tool. The social function that should be considered as part of urban planning is separately undertaken by special sector plans. We have said that the foremost goal of urban planning must be to serve the functional requirements. But based on China's current urban planning practice, urban planning is mostly interpreted as the planning, arrangement

[1] Zhou Ganzhi , fellow of the Chinese Academy of Sciences (CAS) and the Chinese Academy of Engineering (CAE) and former vice minister of the former Ministry of Construction, has said that the 1980s are the "second spring" for the new China's urban planning and development since the "First Five-Year" period.

[2] Zou Deci. *Three Decades of Urban Planning Development: Motivation and Achievement* [J]. Urban Planning Communication. 2008:23, p 11-12.
[3] The predecessor of the Ministry of Housing and Urban-Rural Development (MHURD)
[4] Yang Hongshan. *Urban Planning and Management under the Perspective of Multiple Interests*. Chinese Public Management. 2009:4, p 8-10.
[5] Wang Tianwei, Zhao Lihua, Zhao Na. *Theory and Practice of "Integrating Three Plans into One"*. Urban Planning Society of China. Urban Planning and Scientific Development — 2009 China Urban Planning Annual Conference Proceedings. Urban Planning Society of China. 2009, p 6.

and design of physical spaces. In a way, urban planning has been reduced to urban design. At the same time, many social functions under urban planning are undertaken by plans such as the national economic development plan, public services plan and various government departmental plans. This cannot meet the intrinsic needs of urban development.

Myriad types of plans and poor coordination. Many types of urban plans exist in China, and they are fragmented and uncoordinated. According to incomplete statistics from Shi Nan, vice president of the Urban Planning Society of China (UPSC), 83 legally mandated government plans exist in China, most of which were created during the period of planned economy. Typically, the plans exhibit three characteristics: First, they are numerous and wide-ranging, and many are outside the government's management capacity and capability. Second, the plans are not organically integrated, such that they often overlap, or are either disconnected or poorly delineated. Thus, the plans are far from systematic, and cannot really serve their macro-control functions in the market economy. Third, the entire planning system generally focuses on quantitative indicators. It neglects spatial distribution, and does not consist of an independent and complete spatial planning system.[6]

Based on findings, all levels of government in all the Chinese cities have a planning function. From a vertical planning perspective, other than the overall urban plan, the detailed plan and the land plan, there are also sectoral plans and special plans, such as plans on environmental protection, tourism, marine development, forestry, transportation, water conservancy, industries and social programmes. At a horizontal level, municipal governments, district governments and even sub-district offices are all formulating plans; in addition, special functional zones such as development zones, innovation zones, industrial zones, free trade zones, comprehensive innovation zones and demonstration zones also have their own planning systems and develop their own plans.

A typical example of poor coordination in urban planning is the contradiction between land use planning and urban planning. Based on the above urban planning logic, developing and using land as a resource should be subordinated to and serve the needs of a city's strategic positioning and functions, and is subject to the requirements of urban planning. However, in practice, China's land use plan takes priority over urban plan. City officials grant land use rights to developers even before they seek the planning approval. By putting the cart before the horse, land development and land use are subject to many abuses. Not surprising, many cities that are driven by land-based fiscal regime would follow only one demolition and redevelopment model.

Many Chinese cities do not base their development on the city's function or develop their industries based on resource endowment; instead, they start with physical resources such as land, and espouse the model of "enclose land, demolish and resettle, build city, and create development zone". Indeed, some cities are built, but they are devoid of life and bustle; they are ghost towns. Development zones are fenced and built, but are without business enterprises.

Urban plans lack legal basis. A city's positioning and functions and its planning, design and layout should shape and guide urban development, and should be ascertained by law instead of arbitrarily changing with the leadership's interest.

"Legal basis" has two layers of meaning. The first layer refers to elevating urban plans to status of law, which is adopted by the legislature. This will ensure that the city is a city for all, and not just for the mayors or planning experts. The second layer refers to the need for formulation and modification of urban plans to follow statutory procedures such as needs survey, professional design, public consultation, and hearings.

When conducting his work inspection rounds in the Beijing Municipality on 25 February 2014, General-Secretary of the Chinese Communist Party Mr Xi Jinping emphasised the important guiding role of urban planning in urban development. He noted that the first item to inspect when inspecting a city should be its urban plan, and that a scientific plan offers the greatest benefit, planning error the biggest waste, and frequent plan change the unthinkable.[7] However, currently urban planning in China faces a striking problem of frequent changes of plans and arbitrary interference from political authorities. Zhou Ganshi, former vice minister of the Ministry of Construction and fellow of the Chinese Academy of Engineering and the Chinese Academy of Sciences, once criticised the intensifying administrative interference, heightening the pursuit of scale, westernisation and outlandishness, and excessive demolition in urban planning and development.[8]

[6] Shi Nan. Factors Influencing the Social Function of Urban Planning — Also on the Social Status of Urban Planning Urban Planning. 2005:08, p 9-18.

[7] Xinhua Net: *Xi Jinping inspects Beijing, and makes five points on capital city development*. http://news.xinhuanet.com/politics/2014-02/26/c_119519301.htm

[8] 21st Century Business Herald. Experts: *Less administrative interference in urban planning*. http://www.cityup.org/news/cityplan/20110805/79978-1.shtml

Poor public participation in urban planning. Apart from the administration intervening arbitrarily, urban planning in China is also monopolised by experts. While the social function is excluded in China's urban planning, China's pursuit of technicism also causes its cities to lose their soul and uniqueness; eventually, every city looks exactly the same. Public participation is inadequate, in that urban planning and development do not reflect the citizens' travelling and living needs. "Attractive on the outside but hollow inside" is the best description of the result in the pursuit of technicism by experts. "Extreme modernism" in urban planning and development emphasises design rationality, linear and geometric aesthetics, such as concentration of a single function and spacious plazas.[9]

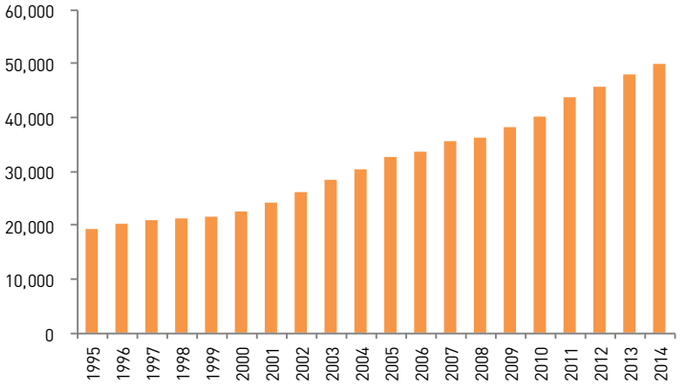
Financing in a land-based fiscal regime affects implementation of urban plans. Mismatches of mandate and fiscal power between the central and local governments have driven local governments to turn to selling land to finance urban development. Local governments therefore resort to large-scale demolition and re-development. They expropriate and auction land to obtain massive sale proceeds and use them to supplement development of local infrastructure and provision of public services.

According to the deputy director of the National Development and Reform Commission's China Centre for Urban Development, land sales revenue between 2000 and 2013 increased from 59.6 billion yuan to 4.2 trillion yuan, representing an average annual increase of 38.7%. The share of land revenue in local revenue increased from 9.3% in 2000 to 60.9% in 2013. From 2000 to 2013, the urban built area doubled, and land sales revenue was nearly 20 trillion yuan. For local governments, regular expenditure is supported by fiscal income and development by land sales.[10] To earn more income from selling land, city governments often disregard urban plans, and find different justifications and excuses to violate or change the plans.

The reform directions for China's urban planning

Returning to the essence of urban planning and serving functional requirements. The development and reform of urban planning should be based on functional requirements. Urban planners should not plan for the sake of planning, or depart from the defined functions of a city and purely allow efficiency considerations or "technical myths" to drive planning.

[9] Liu Yejin. *Extreme Modernism Floods Beijing's Urban Planning and Construction.* http: //blog.10jqka.com.cn/59784541/2661947.shtml
[10] Xinhua Net: *Experts: City construction mode will change as land revenue disappears* [N]. http://finance.people.com.cn/n/2015/0111/c1004-26363662.html



1995–2014 China's urban built-up area. (Unit: km^2)
Source: National Bureau of Statistics of China

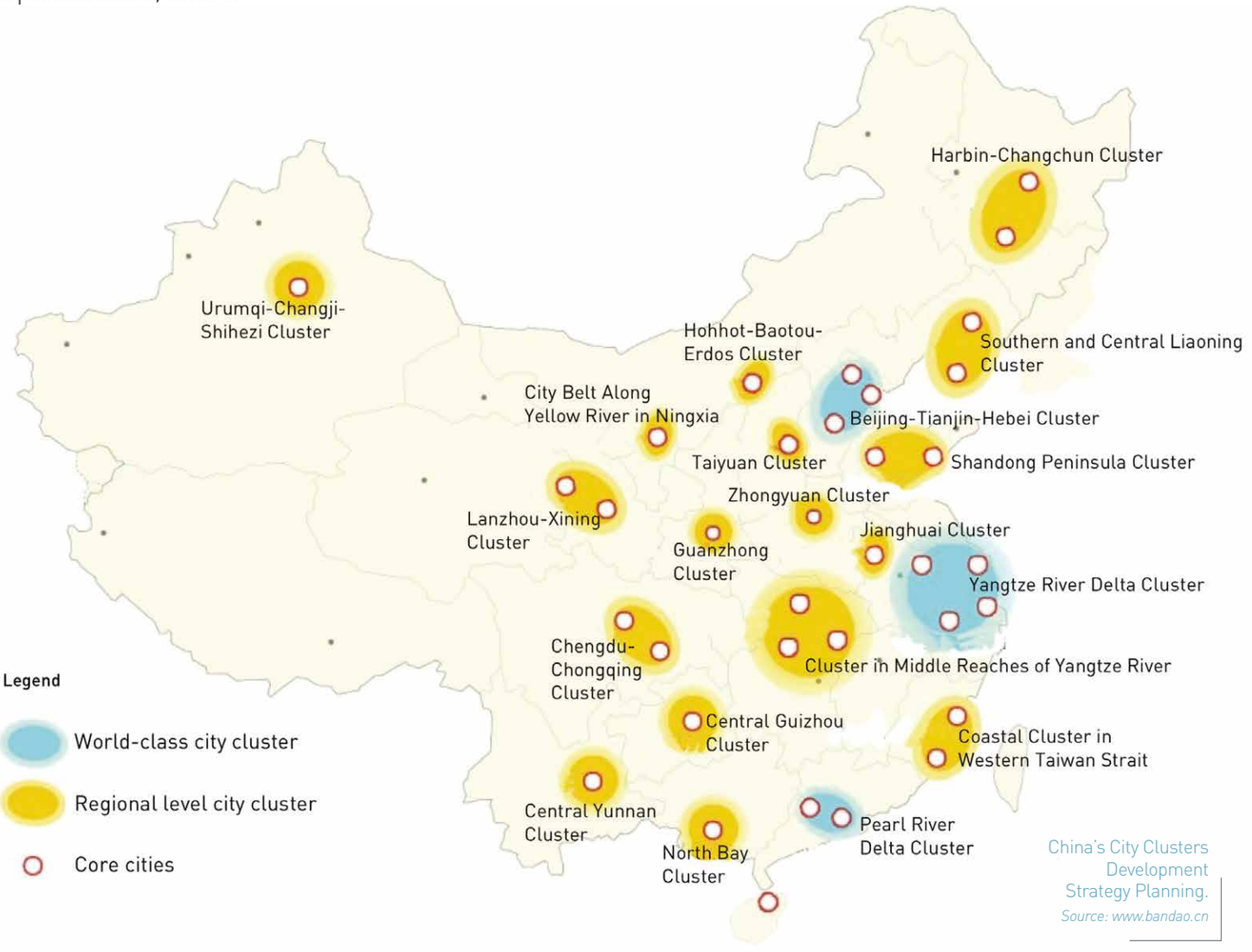
In China, urban planning is affected by complex issues such as fragmentation, segmentation and technology obsession. It is also influenced by those in power, who may alter the plans at their own whim and fancy. Planning can also be monopolised by experts and the powerful, without adequate or real public participation. Therefore, to reform and develop urban planning, China has to return to the essence of urban planning, which is to respond to the functional requirements of economic development and social life within an urban setting. Urban planning as a public policy for urban development, construction and administration must also serve the aspirations of "Better City, Better Life". This calls for the return of urban planning to the concept of "Big Planning", which transcends the constraints of methodology and technicality. Urban planning must meet the comprehensive functional requirements of the urban economy, the society, and services.

Urban planning logics. The city is a composite and complex structure that hosts a variety of functions, including economic development, social services, public services, education, healthcare, employment, industrial development, and technological innovation. It also comprises multiple elements such as labour, land, capital and technology. Urban planning is not simply about arranging urban land and urban spaces; urban "physical order" is not "social order". Urban planning is the policy-making process of urban development. It is a holistic approach to regional development in a metropolitan area, which thus calls

for considering urban land use, transportation, education, housing and economic development under a larger regional context, and for coordinated planning under multi-tier jurisdictions.[11]

First, determining a city's strategic functional plan is the priority. From a planning perspective, defining the city's overall functions and development direction should be at the first level of planning, and may be referred to as the strategic planning of urban development. For example, Beijing is functionally designated as the national political centre, cultural centre, international exchange centre, and technology and innovation centre. This is strategic planning. A city's strategic positioning should stem from its resource endowment. For example, Beijing as capital city attracts copious research institutes and embassies, and this determines its strategic functions in the areas of politics, technological innovation and international exchange. The positioning of a city's strategic functional plan must be clear before the city's development can be distinctive, meaningful, and sustainable. Planning for a city's specific sectors such as land, labour, capital should be subordinated to and serve its strategic functional plan.

Second, planning according to the strategic functional plan. When planning, defining a city's functions and roles is the priority. Economic and industrial planning and public service planning should be based on the strategic positioning of the city's functions. Also, land development planning, master planning, detailed control planning, spatial utilisation planning should be based on the economic plan, public service plan and other functional targets. Land planning, master planning, spatial planning and investment and financing planning are "element planning" that serves a city's functions or overarching positioning; that means, to use these spaces, land and financial resources as inputs to fulfil the roles and functions of a city. Through the design and organisation of urban space, land, and investment and financing, these elements should better serve the city's functions and roles.



China's City Clusters Development Strategy Planning.
Source: www.bandao.cn

[11] David .R. Morgan, et al. *Managing Urban America*. Translated by Yang Hongshan and Chen Jianguo. Renmin University of China Press. 2011, p 117.

Thus, urban planning is a hierarchical process. Strategic functional planning is top-down designing; planning for specific sectors that serves the urban functions is middle-level designing; and resources allocation planning is bottom-level designing. Instead of being bottom-up, where the lower level prescribes what the higher level does, planning should be top-down, where the lower level is subordinated to the higher level. In general, China's urban planning practice is neither sufficiently rational nor systematic, in that urban planning and implementation is not top-down, where the lower level is subordinated to the higher level, but bottom-up, where the lower level dictates the higher level's direction.

Policy design for reforming the urban planning system

In *The Death and Life of Great American Cities*, Jane Jacobs points out that the "ubiquitous principle is the need of cities for a most intricate and close-grained diversity of uses that give each other constant mutual support, both economically and socially."[12] The solution, therefore, lies in reforming the institutions and modes of urban planning, eliminating administrative interference, and moving away from technicism. It also means returning to the essence of urban planning, which is social construction.

Urban Planning for Social Construction. Urban planning is not just about sketching and designing spatial layouts and physical forms. More importantly, it is to increase the public utility of urban spatial layout, economic industries, and public services. To achieve this, we must transcend the technical, transfer and instrumental approaches; instead, urban planning should be regarded as a part of the social construction process. This is the way to plan cities so as to better serve the people's living needs.

Therefore, the planning authorities, implementers, planners and designers must change their perspectives and break the myth of technicism. A city should not just meet aesthetic needs; more so, it must meet the needs of the general public.

A Systematic Approach. In China's urban planning, decentralisation and segmentation are major problems. For many years, many localities have explored reforms relating to planning integration, such as the so called "three in one (*san gui he yi*)" or "many in one (*duo gui he yi*)" reforms. These reforms are, in some extent, meaningful for improving the fragmented planning system. Typical reforms include Guangdong's "three in one" reform[13] and Hainan's "many in one" reform[14] .Given its focus on coordination, the current reform is not a systematic approach. The Development and Reform Commission (DRC) is responsible for socio-economic development planning, the Ministry of Land and Resources for land planning, and the Ministry of Housing and Urban-Rural Development for urban-rural construction planning. With the basic structure unchanged, the reform only harmonises the technical indicators of the three plans. It does not approach planning from a systemic or a top-down approach, or enable the city's strategic functional plan to guide the socio-economic development, use of land resource and development of urban space. There is still a long road of reform in the future.

Legalisation. The Fourth Plenary Session of the 18th CPC Central Committee proposed to comprehensively advance the rule of law, with the overarching goal of building a socialist legal system with Chinese characteristics and a socialist country based on the rule of law (*shehui zhuyi fazhi guojia*). Therefore, urban planning must also proceed in the spirit of the Fourth Plenary Session and be underpinned by the rule of law. While urban planning in China often focuses on the technical aspects, other countries focus first on the statutory content, followed by policy content, then

[12] Jane Jacobs. *The Death and Life of Great American Cities*. Vintage Books, 1992.

[13] On 13 February 2015, the General Office of the Guangdong Provincial People's Government issued a notice to implement the Guangdong Province's Guidelines on "Three Plans in One" (Provisional). According to the notice, "three in one" planning means using the socio- economic development plan as basis to better align the urban-rural development plan and land use master plan, and to ensure coherence of important spatial parameters under the "three plans", such as protected spaces, development boundaries and city size. It also requires planners to use a unified spatial information platform to determine the ecological limit lines, basic farmland limit lines, urban growth boundary limit lines and industrial zone limit lines. Establishing the limit line system enables optimisation of the urban-rural spatial layout, efficient allocation of land resources, conservation and intensive use of land. It also improves administrative efficiency.

[14] On 14 April 2015, the Ministry of Housing and Urban-Rural Development and the Hainan Provincial People's Government signed a cooperation agreement to jointly develop Hainan Province's Master Plan. The Master Plan will integrate multiple plans, including the socio-economic plan, urban-rural development plan, land-use plan and ecological and environment protection plan, etc., which will reconcile the conflicts between the existing plans.

finally, guidance and technical content[15]. Therefore, certain principles and important contents pertaining to urban planning should be elevated to the status of law to strengthen a plan's legal and normative authority, and to prevent plan modifications due to interference and changes by the leadership, which will prevent unnecessary waves of demolition and construction. To elaborate:

First, a city's development direction such as its strategic functional positioning must be elevated to the status of law. In addition, experts also recommend that statutory provisions should also include items such as the urban spatial structure and direction of development, urban planning zones, balance of uses for urban develop land, delimitation of city's "three zones and six lines (*sanqu liuxian*)•", important defence facilities, per capita indicators of urban land use, mandatory requirements on a city's master plan set forth in a higher-level plan, and the implementers of the master plan.

Second, development and modification of urban plans should have legal basis. Many experts have recommended that the power to approve and revise urban plans should rest with the city's People's Congress. A Planning Committee responsible for approving and revising the urban plan and for the plan's implementation supervision should be established under the People's Congress. Important urban development issues must be subject to statutory review and approval procedures, and the threshold for modification of such statutory content should be raised to reduce arbitrariness.

Democratisation. Urban planning falls within the sphere of public policy. As such, public policy-related decisions should be undertaken with scientific rigour and based on democratic processes. The urban planning process must ensure a high degree of democratic participation because the citizens are not only the owners of a city, they are also the immediate users of its infrastructure and public services. Commercial products that do not satisfy consumers are devoid of market value and will not generate profit for businesses. Similarly, in urban governance, infrastructure, plans and public services that fail to satisfy the people's needs are worthless no matter how scientifically-based, exquisite and beautiful the design is.

Emphasis on public participation is one of the core values in modern urban planning. Based on the precepts of pluralism, it seeks multilateral cooperation in the form of "government – public – developer – planner".[16] Therefore, urban planning in China must embrace democratic participation, such that in the process of creating the final plan, stakeholders such as government departments and community organisations involved in decision-making should try to understand and communicate with each other. Planners should not only be the government's or the developer's technical consultants and spokesperson; instead, they are also facilitators, mediators, interpreters and synthesisers.

[15] Ma Wuding, Wen Chaoxiang. *On Reform of China's City Master Planning*. Urban Planning. 2006: 10, p 9–13, 31
• Explanatory Note: "Three zones (*sanqu*) refer to determination of the scale and boundary of three types of zones, i.e. "development prohibition zones (green lands)", non-agricultural development zone (urban development zone) and "controlled development zone (development reserve zone)".
"Six lines (*liuxian*)" refer to delimitation of boundaries and land use, of which the former are highlighted by the so-called six lines (the red line represents the street line or site boundaries; the green line delineates the green system; the blue line, boundaries of water bodies; the purple line, boundaries of historic conservation areas; the yellow line, boundaries of public services; the black line indicating high voltage cables and radiation). These six lines ensure that the graphic representation of all legal plans is consistent and that the respective compulsory elements are considered. Effectively, these six lines establish a zoning system of development control, within which land use is allocated and sets of development conditions (or indices) are attached. __ Adapted from Chen Fei, "The design dimension of China's planning system: urban design for development control" www.tandfonline.com/doi/pdf/10.1080/13563475.2015.1114452

[16] Sun Shiwen, Yin Yue. *Theoretical Foundation of Public Participation in Western Urban Planning and Development.* Foreign Urban Planning. 2004:01, p 15-20, 14.

Intelligent Urban Planning in Singapore
Practice and Insights

LIU Thai Ker

Between 1960 and 2015, Singapore's achievements in urban development in the last five-and-a-half decades have drawn global attention and bear vivid testimony to the fact that a tiny resource-scarce and multi-ethnic island state, without hinterland, can be transformed into a people-oriented, orderly, highly efficient world-class liveable city. This was done by virtue of close collaboration between political leaders and professionals through deliberate yet robust policies, regulations, visionary urban planning and effective implementation. The Singapore experience in urban development has inspired many cities in the world, especially those in Asia. In retrospect, the success of urban transformation in Singapore is due largely to her Intelligent Administrative Culture, Intelligent Planning and Intelligent Implementation of Plans. Throughout the whole process, the Government and professionals consistently paid attention to the opinions of the general public as well as the experts, and actively studied the best practice of other cities, sieved out useful principles and creatively adapted them to Singapore's local conditions. Compared with Singapore, China shares many similar advantages such as efficacy of land administration and policy execution. Especially in the midst of its rapid urbanisation, government officials at different administrative levels give high priority to urban planning. I have had the good fortune of being involved in creating urban plans in China for over three decades now. This has enabled me to have a better understanding of China's urban issues, which motivates me to conscientiously share Singapore's planning experience in the hope of lending a guiding hand to steer them towards healthier urban development.

This essay, consisting of 12 sections, attempts to explain what I have come to call Singapore's "Intelligent Planning" approach in terms of its concepts, methods, principles, and its adaptability and usefulness in the Chinese context. There are five main areas: first, the Intelligent Administrative Culture, Intelligent Planning Process and Intelligent Planning Objectives; second, a description of the process of formulating the Singapore Concept Plan 1991 and its key layer plans, as well as the planning of the Central Business District (CBD) and New Towns; third, the key aspects of Intelligent

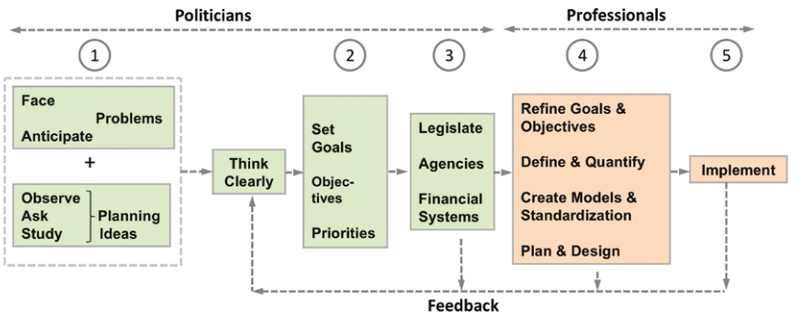


Image 1: The intelligent administrative culture

Planning and highlights of Singapore's planning experience; fourth, a brief overview of my recent planning projects in China; and finally, a comparison of the planning practices between Singapore and China, and my wishes for some Chinese cities.

Intelligent Administrative Culture

The success of Singapore's urban development can be summed up in a few words: High in Speed, Large in Quantity, Credible in Quality and Low in Cost. People tend to attribute these achievements to planners, architects, engineers and other professionals. In reality, the success is owed more to the close interaction between the political leaders and the professionals, which in turn gave rise to the excellent administrative culture that facilitated the development of the society as a whole.

In general, whenever a government introduces a policy and if the results do not quite live up to expectations, adjustments and corrections can be made over time. However, I can think of three areas which cannot tolerate such false starts. First, an inappropriate education policy — this might ruin the future of an entire generation whose youth cannot be recovered or redeemed in any way; second, an ineffective environmental protection policy — this might lead to the destruction of ecology which is impossible to reverse; third, ill-conceived planning and development of the physical environment —when mistakes surface some two decades later, it would be extremely costly to rectify the problems already cast in concrete and steel. Fortunately, Singapore's Government had by and large managed to avert these dire consequences through rigorous studies and careful strategising in

formulating urban policies. This is largely because of the close collaborative working relationship between the political leaders and professionals as illustrated in Image 1. Let me elaborate:

Step One: Identify planning initiatives from two sources. The first would be the current issues that leaders are already confronted with which require urgent action, and the second the potential issues anticipated or foreseen by leaders which must be nipped in the bud. When confronted with either type of challenge, the Government would typically respond by digging into the root causes rather than simply treating the visible symptoms. When real problems were identified, the political leaders would meticulously study the strengths and weaknesses of other cities' experiences. Rather than replicating what others have done, our government would adapt what they have learnt to suit our local context. Such diligence sets a good example for Singapore's government officials to always explore the most appropriate measures for a problem and, over time, accumulate an impressive body of world-class knowledge and skills to tackle urban issues.

Many who had worked with Singapore's first Prime Minister, the late Mr. Lee Kuan Yew, respect him for being an astute worrier. He worried about latent problems and addressed them long before they became serious. For example, in the 1970s, glass curtain walls for high-rise buildings were gaining popularity. However, heat transmitted through the glass would cause an increase in energy consumed to keep the indoor temperature cool, and heat reflected from the glass surface would also increase the ambient outdoor temperature. Hence, a mandatory standard for the "Overall Thermal Transfer Value" (OTTV) of glass curtain walls was introduced, at a time long before the world became concerned with carbon emission control and the urban heat island effect.

Step Two: Set effective macro strategies, specific goals and priorities. A good concept does not automatically lead to solutions. During Singapore's early years of independence, some 1.15 million of a total population of 1.65 million were living in squatter colonies or ghettos. To become a world-class city, an important task was to resettle these people into liveable public housing. Given the limited capacity of the construction industry then, the Housing and Development Board (HDB) was soon set up to tackle this problem as a top priority. Meanwhile, in order to transform the urban landscape as quickly as possible, the "Garden City" vision was actively campaigned. This involved systematic tree-planting and turfing programmes, which were extended to even wasteland and brownfield sites. In Mr. Lee Kuan Yew's own words, this was the cheapest and fastest way to transform the image of a city. Soon after, a pedestrian Walkway Unit was formed to improve the quality of footpaths in the city. In retrospect, this was a very progressive idea raised way before the concept, "City Walkability", caught international attention in recent years. At the same time, parking standards for respective building types were also established. A number of public car parking facilities were also provided for old buildings incapable of meeting parking needs. As a result, rampant illegal roadside parking soon disappeared. Also, in the late 1970s, a new legislation that required all buildings to be repainted every five years was introduced, and dilapidated, dirty buildings became a thing of the past. As Singapore addressed its primary problems diligently, the image of the city was also substantially improved. The measures were large in quantity, high in speed, good in quality and low in cost, without overly relying on iconic buildings.

It is noteworthy that Singapore's pioneer generation of cabinet ministers mostly received tertiary education or had worked in the British colonial government, giving them a good understanding of urban culture. Although they may not have studied urban planning, they instinctively knew what actions or policies would be appropriate for a city. By being rigorous, decisive and effective, they were able to earn the people's trust and carry out their plans relatively smoothly. By contrast, many developing countries are basically agricultural societies where local government officials have little understanding of what makes a good city. On overseas visits, they tend to be attracted by the superficial visual excitement of these cities. Thus, in the process of urban development, they tend to place heavy emphasis on image making and pay less attention to fundamental issues of people's livelihood and environmental quality. I sincerely hope that this unhealthy trend would soon be corrected.

Step Three: Enact laws, set up administrative agencies and provide financial support. The Government needed the Land Acquisition Act to compulsorily acquire private land for specific public purposes, and to move slum dwellers into homes, shops and factories developed by HDB. In the process, large areas of land were cleared for the city's long-term development. Many cities have similar laws, but few are able to make effective use of it. In China, one of the major obstacles in the renewal of urban villages and old urban districts is precisely the issue of land acquisition and resettlement. The Singapore Government is able to use the Land Acquisition Act effectively and extensively because it is highly disciplined in ensuring fair resettlement compensation and developing the land according

to the declared purpose, thus earning the trust of the people. This trust in Government is the cornerstone of the country's effective administration, so much so that even when, occasionally, the general public may not understand the justification of a new policy, they believe in the government based on its track record and willingly go along.

Moreover, there is only one Master Plan in Singapore, and although the plan is revised regularly, its basic structure and principles remain constant. At the same time, there is only one planning authority, the Urban Redevelopment Authority (URA), which has the clear mandate to require all development projects, whether public or private, to comply with the Master Plan and its related Detailed Plans, rules and regulations, so as to ensure that the urban system remains well-coordinated. Though many Singaporeans take such effective arrangements for granted, this is not always the case for many cities, including those in the developed countries.

Based on my understanding, there are multiple government agencies in China making their own plans; for example, the National Development and Reform Commission (NDRC) is responsible for the Social-Economic Development Plan, the Ministry of Land and Resources (MLR) for the General Land Use Plan, the Ministry of Environmental Protection (MEP) for the Environmental Protection plan, and the Ministry of Housing and Urban-Rural Development (MHURD) for the City Master Plan. These multiple plans will inevitably lead to confusion and conflict for developments, and inefficiency for administrators. The Chinese government recently suggested to combine "Four Plans into One" ("四规合一"). This is truly timely. I wish it could be done well and soon. Moreover, the urban plan itself is often not specific enough and therefore difficult to enforce. In addition, each district, county or town usually has its own plan, resulting in the sum of parts being greater than the whole, with the combined effect eventually deviating from the City Master Plan.

On the other hand, precisely because the planning agency of Singapore enjoys strong administrative authority, there is equally great pressure on those involved to ensure that all plans and regulations are fair, beneficial and convincing to the people so affected. The Singapore Concept Plan or Master Plan must therefore be, and indeed was, carefully and intelligently thought through. If strong enforcement power is coupled with a poorly designed plan, it will adversely affect the entire city. With regard to the financial and manpower resources allocated to public agencies, every government project was put through a careful process of evaluation, so as to ensure that public funds had been spent prudently. Clear priority was also set to implement government plans on a just-in-time, just-in-need basis, minimising wasteful investment. A virtuous flow of funds thus emerged, enabling the government to embark on other new projects.

Step Four: Professional work is best left to the professionals, with ample space for exploration. Political leaders and professionals need to maintain a healthy level of mutual respect, each playing its part and complementing each other to avoid undue interference. Singapore's political leaders give professionals reasonable time and opportunity to define and carry out their tasks to fulfil clear planning objectives. I returned to Singapore to work in the Housing and Development Board in 1969. At that time, most professionals involved in the onerous tasks of nation building were very young and inexperienced, myself included. We were determined to keep an open-mind in studying the basic structure and key planning principles of other cities. We also paid close attention to the opinions of the general public and the experts. Through all these endeavours, we honed our skills in urban planning. From as large as cities and regions, to as small as neighbourhoods, precincts, blocks, corridors and dwelling units, my colleagues and I tried our best to make everything people-oriented, liveable, sustainable and beautiful. By going through this process, we were able to come to grips with the inter-relationships among definition, scale, quantum and land use category, thereby constructing a number of planning prototypes to better ensure the quality of our work in the name of what I believe to be "Intelligent Urban Planning". In retrospect, allow me a little self-praise: "My greatest talent is not allowing myself to believe that I have talent."

During my working days at the Urban Redevelopment Authority (URA) as the Chief Planner, we continued doing extensive research, this time, encompassing the entire island. In the interest of quality control and standardisation of technical requirements, the Government introduced a variety of technical guidelines, urban prototypes and planning parameters, such as tree-planting guidelines and standard road sections. Through this effort, our planners, architects and engineers grew more confident of creating a city both functional and beautiful. Singapore is small in size, so we had to make full use of all available resources, skilfully fine tuning the juxtaposition of building heights, density and greenery. Thus the City was created with high-density without feeling unduly dense, with limited land without feeling unduly small, and with small green spaces yet feels like a garden. In other words, with some care and skills, planners could create positive illusions of the city. Many Chinese friends who come to Singapore

would tell me, a couple of days after their arrival, that Singapore feels larger than its actual size. When the famous Japanese architect Kenzo Tange visited one of our satellite towns, he felt that the population density did not seem as high as suggested by the numbers. Thus, in my view, creativity of urban planning is not about sketching curvaceous lines and strangely shaped buildings. Rather, it is about having a good understanding of the more important fundamental issues.

Even today, working at RSP Architects Planners & Engineers Pte Ltd, a private consulting firm, I continue to keep this up, digging into the root causes of problems and constantly improving myself. Rather than accepting what the books say as gospel truth, we actively question and innovate, developing better planning norms and standards and applying the accumulated knowledge to projects in other cities. Although strong government support is important, the planning profession also requires solid skills. In fact, a planner is the doctor of the city. No one would allow a dentist to operate on his eye. However, urban plans in the form of drawings look pretty simple, with just a few lines and seemingly random colour patches, as if anyone could have a hand in it. This is why architects or landscape designers are often invited to do planning; even some government officials are keen to get directly involved. This would be inconceivable in the medical field. Planning drawings may look innocent, but poorly composed plans can do great harm when translated into concrete and steel, which is hard to reverse. Singapore's Government takes urban planning very seriously. For that matter, I am inclined to say that when it comes to planning, the highest authority in Singapore is neither the President nor the Prime Minister, but the Truth. Even the President or the Prime Minister would respect the Truth, so that the best ideas would triumph for the benefit of the country.

Step Five: Implement the plans. Apart from Intelligent Planning, what is equally important is to devise an Intelligent Implementation mechanism, another exhausting but necessary task requiring rational logic and high efficiency. As seen in Image 2, through this process, we are more likely to create a city both functional and beautiful.

Singapore's planning process began with the Government spelling out an ambitious but pragmatic vision for urban development, as well as strategies and policies. Immediately following the completion of the Concept Plan was the statutory Master Plan, the Detailed Plans and Urban Design Guidelines. Concurrently, corresponding plans for infrastructure such as Water, Electricity, Sewage, Telecommunications, Roads and Public Transportation

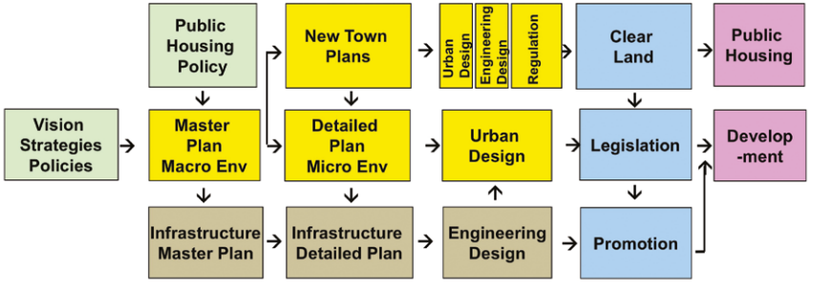


Image 2: The intelligent implementation mechanism of plans

were also put in place from the Master Plan level down to the Detailed Plan level to ensure that the city's infrastructure would function well and be integrated with the land use at all times. Further, when urban design was being carried out, engineering design progressed concurrently. Thereafter, the Government set about to systematically pass legislation, clear land, launch promotions, and eventually, began development.

The implementation of urban plans requires the participation of various government departments. Fortunately, the ministries of Singapore generally work very closely together. Rarely is any ministry seen to stray from the agreed common track. In fact, such close collaboration has always been the envy of other countries. For example, when the engineers finished designing the infrastructure, they would let me make refinements so that the infrastructure would not only relate well with land use, but also be user-friendly and aesthetically pleasing. Through such collaboration, I have made friends with many engineers, who stay in close touch until today.

One important contribution to Singapore's urban development is a policy rarely seen elsewhere in the world – our Public Housing Policy. This massive building programme contributes to urban development in three main ways. First, it met the urgent social need of resettling squatter colonies, facilitating our city-state in embarking on the journey towards modernisation. Second, through this process, large parcels of land were cleared, which were used not only for housing development, but also provided ample space for commercial, industrial and infrastructural developments. Third, the HDB's "New Towns" have played the important role as the key building blocks of the city, which help rationalise the city's spatial structure and environmental quality.

Intelligent Planning Process

Successful urbanisation needs a good planning blueprint. I have to emphasise again the importance of "Intelligent Planning", which means to study and think through urban issues meticulously and rationally. The unfortunate reality is that many leaders, upon deciding on developing their cities, would look straight into landmark buildings, underplaying the fundamental process of translating concepts into plans and the subsequent process of proper implementation. It is such haste which causes many cities to be haphazardly pieced together. Singapore's intelligent planning process, as in Image 3, consists of 10 steps.

Step One: Set a vision. First of all, decision-makers must have the will to develop, and then extensively collect and sieve through theories and ideas from experts, as well as consider the aspirations and needs of both citizens and government in order to eventually formulate an actionable vision for the urban plan.

Step Two: Project future population. Planning should start with population projection. Decision-makers and planners need to collect and analyse the basic information of the city in order to estimate the suitable population size, density, and land area required. That would enable the planners to decide the category of the city to which it belongs according to the Family of Cities model (refer to Image 7).

Step Three: Quantify urban components. A city works like a gigantic machine for living. Planners need to quantify urban components based on

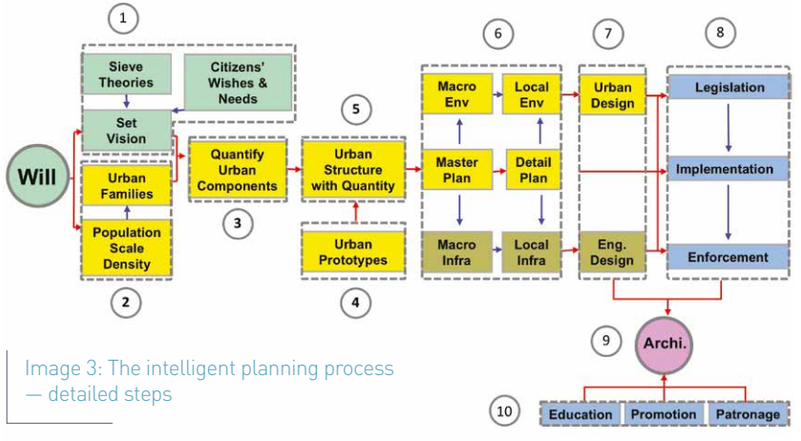


Image 3: The intelligent planning process — detailed steps

the projected population size, draw up planning standards, and understand the configuration of these components within the machine and the appropriate way of assembling all the parts. In the process, various factors such as sociology, economy, environment, ecology and so on, must be considered as well.

Step Four: Construct urban prototypes. A common problem in planning is the ambiguity of definitions. For example, what is a city, or a new town, or a neighbourhood? Even with correct definitions, the spatial structural relationships may not be clearly understood. After confirming the population size and category of the city, and quantifying urban components, Intelligent Planning calls for a clearly constructed diagram of an urban prototype which indicates the essential spatial relationships among land use, various functional areas and transportation networks. This process helps prevent arbitrary decision-making.

Step Five: Quantify urban structure. Based on the urban prototypes and their quantity requirements of urban components, while respecting the landform and constraints of the existing city, the spatial structural plan of a city should next be expressed in drawing. Despite the fact that the unique natural landscape and urban characteristics of every city must be protected when drafting a new plan, the basic planning principles must still be strictly adhered to, so that urban functions are ensured. Meanwhile, the characteristics of each city are enhanced by its uniqueness of nature, history and traditional custom.

Step Six: Develop Master Plan and Detailed Plans. After the structural plan is done, all important urban components, such as the green-blue system, transportation system, commercial centres system, industrial land, facilities as well as residential areas, are to be shown in the Master Plan and Detailed Plans. Always plan from the macro-environment to the micro-environment. Similarly, the planning and design of infrastructure should move from macro to micro levels.

Step Seven: Urban design. By specifying the planning requirements in terms of land use type, plot ratio and building height etc., the design of each land parcel is well-defined. Moreover, for specific areas such as major commercial centres or historical districts, more detailed design criteria should be provided with regard to the layout of public spaces, scale of streets and pedestrian walkway systems. Where required, further detailed parameters and development control guidelines should be worked out for

the purpose of land sale. One might add that the beauty of a city lies in the harmony of background buildings and a few outstanding iconic landmarks. The effect is just like the harmonious voices of choir members accentuated with the sound of the soloist. The relationship between background and iconic buildings needs to be well taken care of through urban design.

Step Eight: Draft regulations, guidelines and standards to capture important principles and requirements envisioned in the plan. Devise an effective planning review and management system to assist the planning authority in ensuring that individual developments comply with the requirements of the Master Plan, Detailed Plans and urban design guidelines, so that individual projects become integral parts of the overall urban development.

Step Nine: Architectural design. Architectural design must observe planning rules and regulations. Although the planning agency should not impose mandatory design preferences, it is still desirable for architects to reflect the characteristics of regional climatic and local culture in their designs.

Step Ten: "Software" efforts. By nurturing citizens' love for culture, elevating artistic accomplishments of artists and involvement of cultural enthusiasts, encouraging patronage and organising special events to raise awareness, the cultural and sports facilities could then be utilised more meaningfully with the support of the people.

This is how the urban plans were put together in Singapore. Different technical dimensions are involved at every stage of the planning process; deliberate sieving and weighing is needed before embarking on Intelligent Design, Development and Implementation. Every step requires different yet solid techniques and skills in order to achieve good results.

Four Key Objectives of Intelligent Planning

Address the Basic Needs of People

Between the rudimentary Concept Plan of 1971 and the finalised Concept Plan of 1991, New Towns had undertaken the critical function of being the basic building blocks of Singapore's rapid urban development, urgently addressing the people's need for housing which is always of the highest priority in urban development, as evidenced by the Chinese idiom *"anju leye* (安居乐业)", meaning: it is only with decent housing that one can enjoy his work. During the initial years of independence, Housing and Development Board (HDB) in Singapore was tasked with the core mission of "Breaking the Backbone of the Housing Shortage". By the late 1970s, when the Government realised that HDB was capable of relocating massive squatter and poor urban residents to high-rise apartments, a new slogan, "Home Ownership for All", was introduced. It is through these policies and the affordability of the flats, that more than 80% of Singapore's citizen and permanent residents live in HDB flats today. Among them more than 90% own their flats. In all likelihood, this is a world record.

Reflecting on China's situation, a preoccupation with urban expansion and star projects has caused some delay in addressing fundamental urban issues such as land acquisition and relocation, cleaning-up of urban villages, as well as public housing provision and resettlement. A city is an integrated urban system. Basic issues need to be properly addressed, not bypassed. The later a problem is tackled, the higher the price to be paid. As China's economy keeps improving and its rate of urbanisation keeps accelerating, demand for better urban environment and higher standard of living rises as follows. Urban villages may then become increasingly unacceptable. In addition, central areas of old cities are in need of better facilities, at times even renewal and transformation. If China could enhance its public housing policy and resettlement mechanism while strengthening its people-centred administration system and legal framework, in addition to scientific planning and architectural design, the cities could then become more liveable and social conflicts less acute.

Ensure the Basic Functions of Land

Singapore shares a common feature with many other Asian cities; that is, high population density. Even so, basic necessities such as water, electricity, gas and telecommunications are ensured through careful infrastructure planning. At every stage of our development, the Government introduced a series of strategic policies on the location choice for major infrastructures involving our national security and economic lifeline, such as oil refineries, military land, reservoirs and airports, to ensure that the city functions well with minimal disruption to daily lives. In a land-scarce country like Singapore, Government officials are forever watchful so as to avoid paying the high price of poorly-made decisions.

Separated from disruptive infrastructure, citizens' daily activities, such as shopping, schooling, leisure and recreation, religious services and eldercare are all incorporated into the land use arrangement in the urban plan.

In terms of traffic, it is rather smooth, due mainly to the decentralisation of urban functions which are distributed hierarchically to different scales of communities. Critically, expressways and local road network are well integrated with land use and urban functions. Meanwhile, great emphasis is placed on the development of efficient and convenient Mass Rapid Transit (MRT) and bus systems to encourage more people to take public transportation instead of driving. Although the building of Singapore's MRT system began only in the 1980s, its preparation had started with the Concept Plan 1971. Land was acquired and people resettled in advance, with land development controlled by planning, thereby saving substantial land cost, securing the effectiveness of the transportation system.

Ensure the Sustainability of Land

Intelligent planning emphasises the integration of nature and nurture. For a city, nature is about its natural environment and resources, as well as historical and cultural heritage, all of which cannot be regenerated or replicated. Together, they serve as the foundation for creating a city's unique character. Nurture refers to urban development, which calls for a liveable environment, full functionality and sustainable ecology.

Singapore attaches great importance to the preservation of its natural environment with distinct characteristics. No two cities in the world have identical natural environments. Through protection, this alone will give the city its own uniqueness. Unfortunately, in many developing countries, flattening mountains and reclaiming land from water bodies are common practices. In the haste to urbanise, while most decision-makers wish for their respective cities to have a unique character, these important resources are often destroyed unknowingly.

As for the quality of air and water, the Singapore Government introduced pollution control almost from the very beginning of our independence. Back then, Singapore was very poor and desperately in need of foreign investment. For instance, there was a multinational company that wanted to build its factory in the city centre near the Golden Mile Complex. Although the Government had badly wanted the investment, it stood firm on its planning principles and could not bring itself to approve the choice of location. With some negotiation and tax incentives, the investor was finally persuaded to locate its factory in Jurong Industrial Park. This incident illustrates again that it is only by understanding and adhering to key principles can an excellent living environment be achieved.

Improve Quality of Life

The process of Intelligent Planning calls for an enormous amount of research and investigation in order to continue improving urban liveability. Initially, when thousands of residents were resettled into high-rise public housing estates from squatter colonies, the Government and planners searched hard for ways to nurture community spirit and neighbourly cohesion within as short a time as possible in this brand new environment. To this end, New Towns were sub-divided into neighbourhoods, and neighbourhoods into precincts. Each precinct is approximately 3 to 5 hectares. It is a size intimate enough for residents to develop an attachment to the land, and nurture a sense of community with fellow neighbours. To reinforce this objective, town centres and neighbourhood centres were designed for the dual purposes of commercial and civic activities. Facilities include shops, clinics, playgrounds, and so on. After shopping, residents are able to chat with friends and relatives in surrounding eating houses and small public squares, while the children play at the playgrounds. Sports facilities, institutional sites, religious sites for various religions and petrol stations were also carefully studied and incorporated into every New Town. In view of these considerations, residential land generally accounts for only about 45% of the total land area of a New Town.

In China, the planned population size and functions of a Neighbourhood (小区) are similar to those of Singapore, except that the amenities provided need some improvement. However, a planned Residential District (居住区) in China is generally smaller than our New Towns, at approximately the size of 3 to 4 neighbourhoods. By and large, Residential Districts are developed essentially for housing and basic living facilities. There is little consideration for incorporating jobs and making the community more self-sufficient. Also, its relationships with the urban road network and industrial estates appear random. The criteria for the provision of urban amenities also need greater clarity.

In view of these observations, Singapore's urban planning experience is valuable. During the initial planning stages, we realised that Singapore needed to be planned well as a city. Our commercial centres are easily accessible; our living environment is comfortable and our vibrant city centre attracts big crowds. These are the results of meticulous planning and solid hard work.

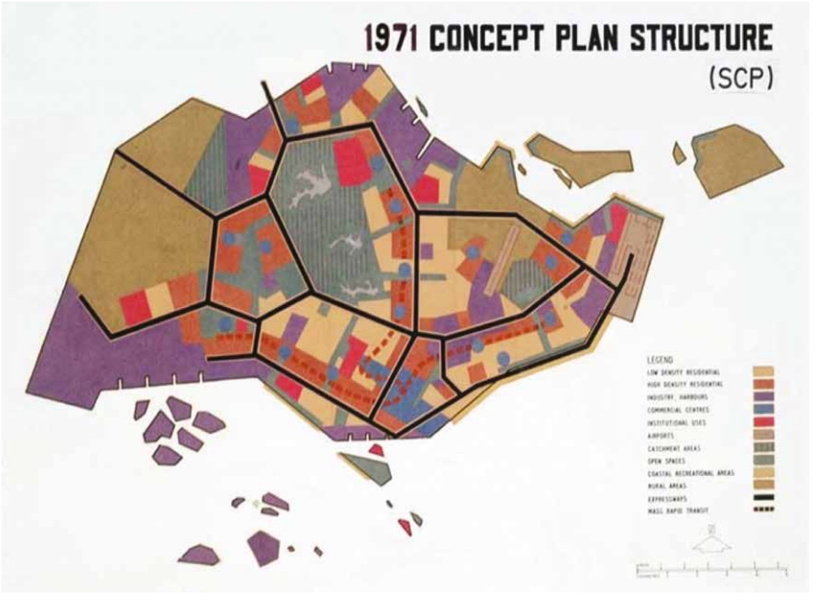


Image 4: Singapore Concept Plan 1971
Source: Urban Redevelopment Authority, Singapore

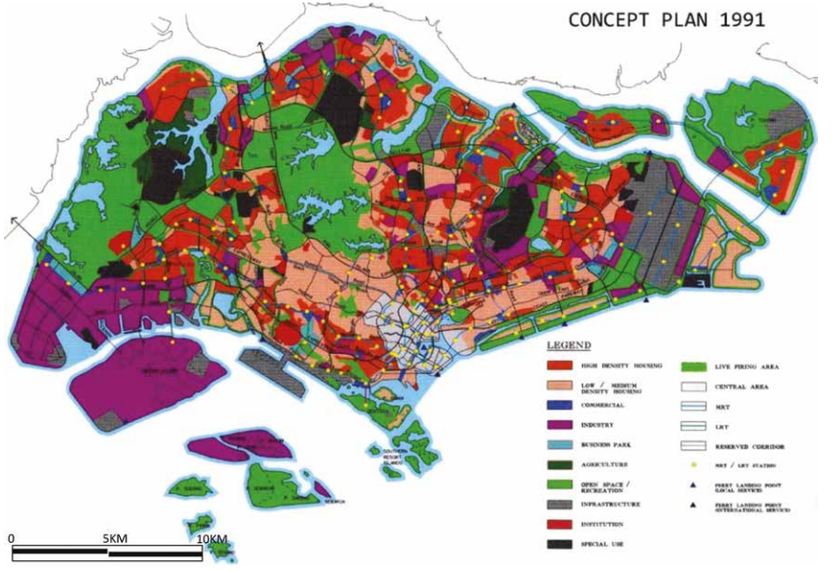


Image 5: Singapore Concept Plan 1991
Source: Urban Redevelopment Authority, Singapore

Formulating the Singapore Concept Plan

Singapore's first Concept Plan 1971 was prepared with the assistance of the United Nations Development Programme (UNDP) (See Image 4). It envisioned a population of 3.4 million by the year 1992. The urban structure of this plan consists of a ring-like urban corridor encircling the central water catchment area and two linear urban corridors extending along the east and west coasts of this island-city. Along these corridors are high-density satellite towns mainly for public housing development. A pair of expressways would run along the two edges of these corridors, with a parallel rail-based MRT line in between.

However, the pace of Singapore's development exceeded the forecast. By 1982, its population size had already reached 2.9 million and the infrastructure development was quickly catching up with international standards. The vision in the Singapore Concept Plan 1971 had to be revised. Consequently between 1985 and 1989, all government ministries were asked to forecast, with quantification, the population, land size, and built-up area required for the needs of the people for various activities, so as to provide a set of solid quantitative specifications for use in the Concept Plan 1991. It was my privilege to be assigned the task of translating these findings into the required development intensity and land area before embarking on the journey of creating the much more ambitious Singapore Concept Plan 1991 (Image 5) while respecting the planning principles and systems set out in the 1971 version.

Paint the Vision

The vision for Concept Plan 1991 was "Towards a Unique Tropical City of Excellence". The word "Excellence" means "World Class". "City" suggests the complete provision of functions and where everything works smoothly. The plan aspires to balance live, work, play, learn and move while pursuing the uniqueness of the local culture and characteristics of a tropical island. A city that is healthy and beautiful, unique and gracious, with a distinct character was envisioned. It weaves together nature and heritage with new urban development in earnest pursuit of an excellent and a high-quality environment.

Set the Targets

After deciding on the vision, the basic urban indicators had to be quantified. Singapore's population in 1991 was 3.2 million, and was estimated to reach 5.5 million by Year X. Although the time frame to year X was not specified, the calculations were based on a 100 year projection. The key consideration was based on the fact that over 70% of land was lease land with 99 years being the longest lease, and the rest private freehold land. By doing so, given the worst case scenario that the population projection was too low and the land supply scarce, it allows for the opportunity to renew and redevelop the city after the lease expires.

Unexpectedly, Singapore's population reached 5.5 million in the year 2015, which was 75 years sooner than planned. It is always difficult for any government to control urban population growth. Therefore, a conscious effort to prepare for the worst case scenario as early as possible is essential by utilising land resources effectively and carrying out long-term arrangements through urban planning. China, as the second largest economy in the world, is experiencing rapid urbanisation, and inevitably its urban population will grow significantly.

China's current practice requires a city's master plan to have a time target set at only 20-years, which does not make for sustainable long-term development in terms of space, structure and resource. When planning in China, I usually project the population size over a 50 to 60-year timeframe, and often, the targets that I propose are higher than the local government's expectations. The main reason is that it is always safer to err on the high side in urban population projection. After some explanation, when local governments finally understand the practical significance of a long-term planning target, they typically support my proposal.

To support Singapore's long-term development needs and to maintain the high quality of its urban environment, I recently suggested publicly that Singapore should initiate a new round of planning for 100 years, based on a projected population of 10 million. My intention and motivation of the proposal mainly takes into consideration three factors. First, the pressure on population growth is greatly affected by the demands of economic development, which cannot be controlled fully by any government. Second, from the perspective of long-term development, Singapore will exist for a further hundreds or thousands of years as a sovereign nation, and thus the large population size is unavoidable. Third, raising the target of the projected

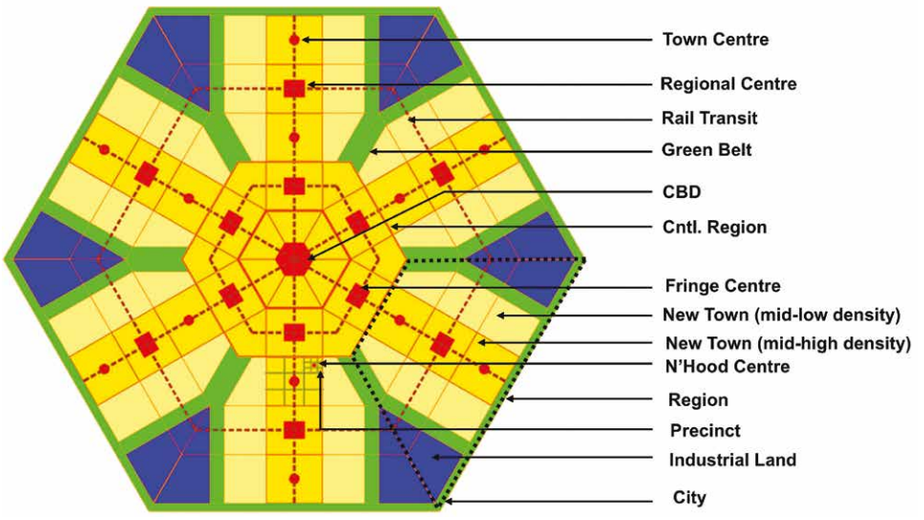


Image 6: The prototype of a City

population sooner rather than later allows us to take maximum advantage of currently available land for development, giving us better planning leverage and a higher possibility of success in the exploration and creation of a good environment with a higher population density. If this tough choice is deferred, even the best miracle worker will be powerless to make any change.

The Prototype of a City

As described under the section of Intelligent Planning process, planning starts with an understanding of "What is a City?" I have constructed a workable prototype (Image 6) of a City as an organic system consisting of multiple hierarchical urban cells, which has the following basic characteristics:

An urban population size of 2 to 5 million will normally be sufficient to support a city and enable it to function well independently. Based on a population density of 10,000 persons per square kilometre, the required urban area will be approximately 300 to 500 square kilometres. The city can be divided into several Regions, according to the population size,

natural environment and transportation system, each having a population size of approximately 600,000 to1 million persons. After this, each region is sub-divided into New Towns flanked by expressways, with a population of about 150,000 to 300,000 persons each. Within these New Towns, Neighbourhoods are defined by arterial roads, each with a population size of about 4,000 to 8,000 households. Once again, these Neighbourhoods are further divided into precincts by local roads or greenbelts, each with a population of 700 to 1,000 households.

In this system, generally Class I industries, which cause little or no pollution, may be located within a New Town or its surrounding small scale industrial zones; whereas Class II and III type of industries need to be relatively concentrated at the fringe of the city and separated from residential areas by green belts.

Commercial centres of all levels — the Central Business District (CBD), Regional Centres, New Town Centres and Neighbourhood Centres — together form a system of centres interconnected by a rail transit system. Population density is distributed according to the density of the rail transit network and the hierarchy of commercial centres. Meaning,

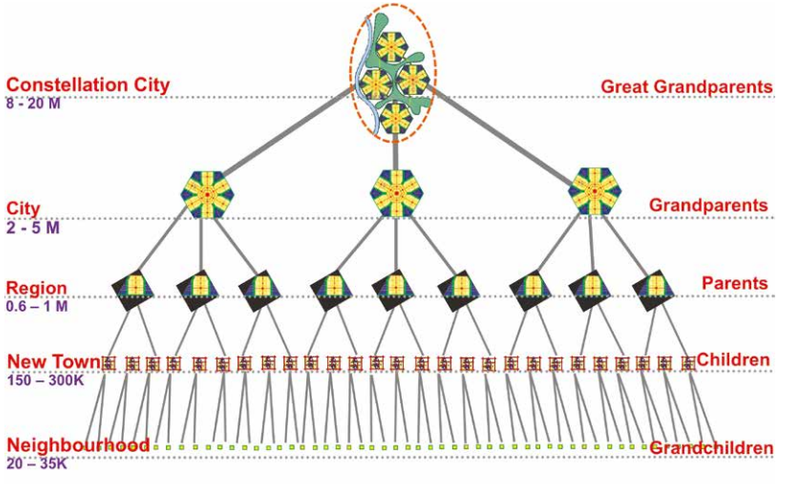


Image 7: The Model of the Family of Cities (part 1)

areas in close proximity to the rail transit lines and commercial nodes are higher in density.

Applying the above principles of this prototype in planning, with due consideration for a city's landform and existing developments, will enable one to achieve a good plan, complete with functions and a unique environmental character.

The Model of the Family of Cities

Cities in general need to have a certain population size to operate independently and achieve full-functionality. At the same time, they need to avoid having an oversized population resulting in reckless urban sprawl, which may worsen the situation of the "Urban Disease". Megacities of more than 10 million in population could be divided into several medium-sized cities within the region, to form an urban structure, for which I have coined the term "Constellation City". The urban functions of each city within a Constellation City are relatively independent, but they are interrelated in terms of ecology, industries and transportation systems.

Drawing comparison to a family tree (Image 7), the Constellation City corresponds to the great-grandparents of a big family, under which the City refers to the Grandparents, Region to the Parents, New Town to the Children, Neighbourhood to the Grandchildren, and finally the Precinct to the Great-Grandchildren. The urban scale and population size will decrease hierarchically. This model of the Family of Cities illustrates how we should look at the urban issues of megacities and how we should deal with a city's spatial expansion and hierarchy of functional arrangements, reasonably and systematically, so as to determine the appropriate urban structure and development strategies.

Although there are important logical relationships within a city's basic urban structure, cities can still be planned organically by responding sensitively to their respective natural landforms, topographies and existing developments. Whether compact or scattered, the fundamental structure remains intact. In other words, some regions may be located further away from the city centre due to geographical constraints, but scale- and function-wise, it is still considered a Region of the same city, relatively independent while still relying on the central area to some degree. The same principle also applies to new towns and neighbourhoods, allowing some to be scattered away from the

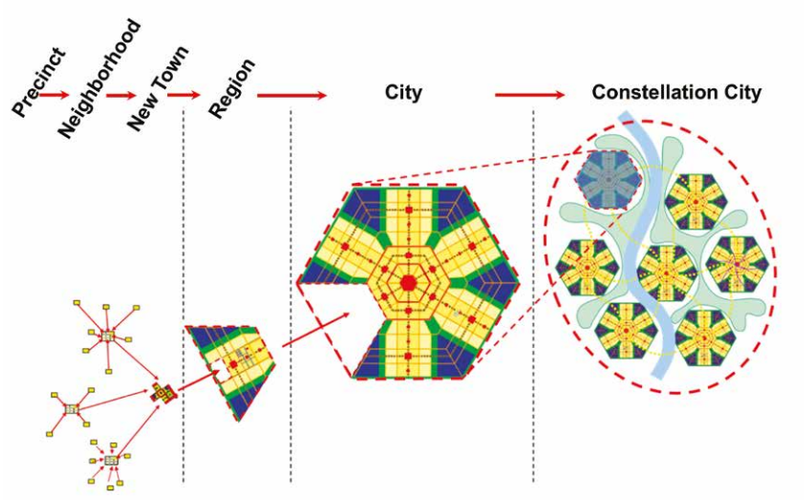


Image 8: The Model of the Family of Cities (part 2)

main urban area (Image 8). Through the Family of Cities concept, the hierarchy and functions of Urban Cells can be clearly defined and organised so as to rationalise the provision of transportation infrastructure and public facilities.

Following the natural progression of urban development around the world, urbanised areas with regional or global influence tend to develop into clusters of several megacities with a population size exceeding 10 million each, which eventually evolve into a belt of urbanised areas. In order to understand this phenomenon in the context of the Family of Cities model, it refers to a cluster of Constellation Cities and could be vividly termed as an Urban Milky Way. For instance, the three most developed eastern coastal regions in China, namely the Jing-Jin-Ji Pan Bohai Rim Region, the Yangtze River Delta Region and the Pearl River Delta Region are typical examples of Urban Milky Ways.

Layer Plans of the Singapore Concept Plan 1991

Planning Structure

The Singapore Concept Plan 1991 was prepared according to the prototype of a City. In the plan, the island-city was carved into five Regions, with each Region sub-divided into New Towns (Satellite Towns). In order to ease congestion in the city centre and to improve the convenience of the people, a hierarchy of commercial centres of different sizes were created outside the central area. After considering historical, practical and geographical factors, the Central Business District (CBD) was located at the south of the city, and Regional Centres were set up in the remaining 4 regions. In order to fine-tune this hierarchical system of centres, Sub-Regional Centres were also provided. In the vicinity of the CBD, Fringe Centres were introduced to supplement the functions of the CBD. All levels of commercial centres were served and interconnected by a rail transit network of five radial and three ring-like railway lines. Key commercial centres were located at the intersections of the rail transit lines (Image 9).

Natural Resources — No Two Cities Have Identical Natural Landscapes

Despite Singapore's land scarcity, we have managed to keep nature reserves such as the Bukit Timah Nature Reserve, Labrador Nature Reserve, Telok Blangah Hill Park, Bukit Batok Nature Park and Mount Faber Park. Most reservoirs and rivers have similarly been preserved in their natural state, with only those rivers cutting across urban areas strengthened by embankments.

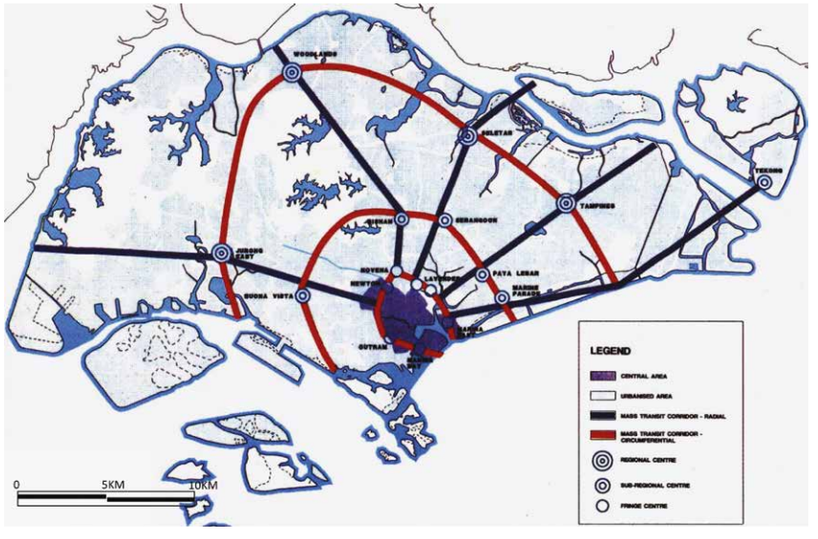


Image 9: The urban structure
Source: Urban Redevelopment Authority, Singapore

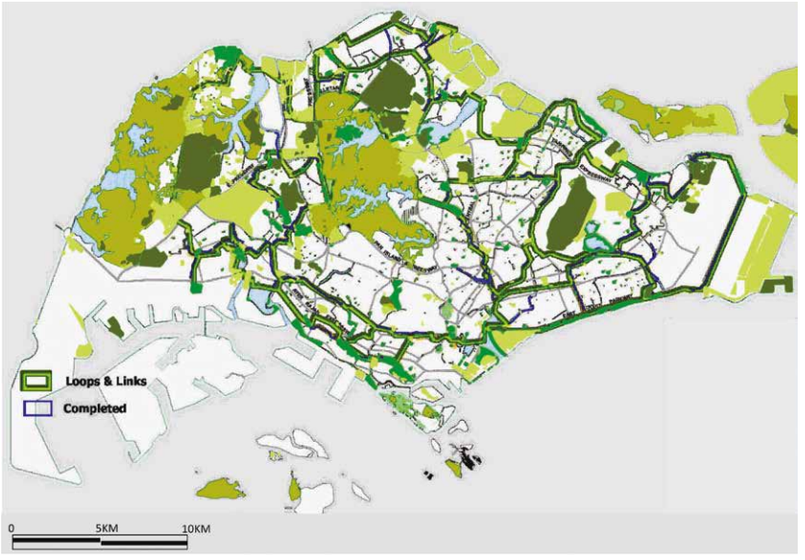


Image 10: Layer plan of natural resources

Source: National Parks Board, Singapore; Urban Redevelopment Authority, Singapore; RSP Architects Planners & Engineers Pte Ltd, Singapore

With regard to land reclamation, during the 1960s, long before the problem of rising sea levels escalated as a global issue, the Government had decided that the reclaimed land along the East Coast must be eight feet above the water level at high tide. Assisted by virtual modelling, new beaches along the reclaimed coastal areas were created gradually by the natural action of wave. My colleagues and I also decided to preserve a 2 km stretch of primary beach near Sungei Changi, so that our subsequent generations could experience the flavor of Singapore's primitive coastline. Several islands, such as St John's Island, Kusu Island and Pulau Ubin, have been preserved in their original state as well.

In addition, newly planned parks and reservoirs are also distributed all over the island, including neighbourhood parks, new town parks, as well as several regional and national parks. Some examples are the East Coast Park, Bishan Park and Seletar Reservoir Park. Between the parks are ecological and recreational corridors created with rivers and green belts, which, together with the road side green, form the urban green-blue system (Image 10). When developing the 1991 Concept Plan, the boundary of the Bukit Timah Nature Reserve was expanded to cover the entire hill and its surrounding forests. When planning Bukit Batok New Town, an abandoned granite quarry was transformed into a picturesque park surrounded by towering cliffs overlooking deep pools, hence crowned "Little Guilin" ("小桂林"). Other pretty parks created after independence include the Chinese Garden, Japanese Garden, Gardens by the Bay, Singapore Zoological Gardens and Jurong Bird Park. What is noteworthy is that the Botanic Gardens, founded during the British colonial days, is not only a park with valuable cultural and historical significance, but also an important world-class research base for tropical flora, and was honoured as a World Heritage Site by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2015.

History and Culture — Every City Has Its Own "Forbidden City"

I often tell Chinese friends that every city has its own Forbidden City. What I actually mean is that no Chinese would dare suggest tearing down and rebuilding Beijing's Forbidden City. However, in many cities outside Beijing, numerous precious old buildings are casually demolished. If these were perceived as their Forbidden City, there is a chance that these could still be preserved. Although Singapore's history pales in comparison with China's, we still cherish our legacy and strive to preserve our connection to our roots. When preparing the 1991 Concept Plan, one important task was for us to identify all natural areas and historic buildings worth conserving, with the land thus occupied treated as non-existent for urbanisation. Planners had to look elsewhere for sites for development. Until today, over 7,000 old buildings have been gazetted for conservation (Image 11).

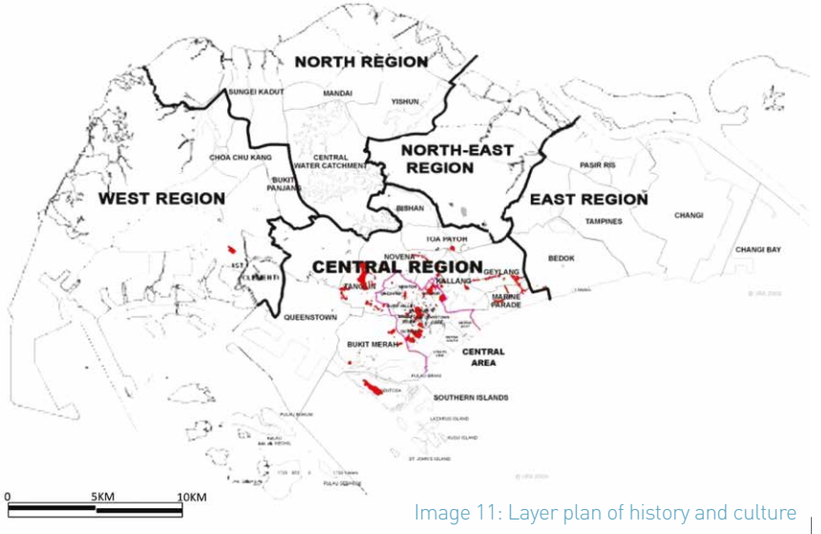


Image 11: Layer plan of history and culture

Source: Urban Redevelopment Authority, Singapore
RSP Architects Planners & Engineers Pte Ltd, Singapore

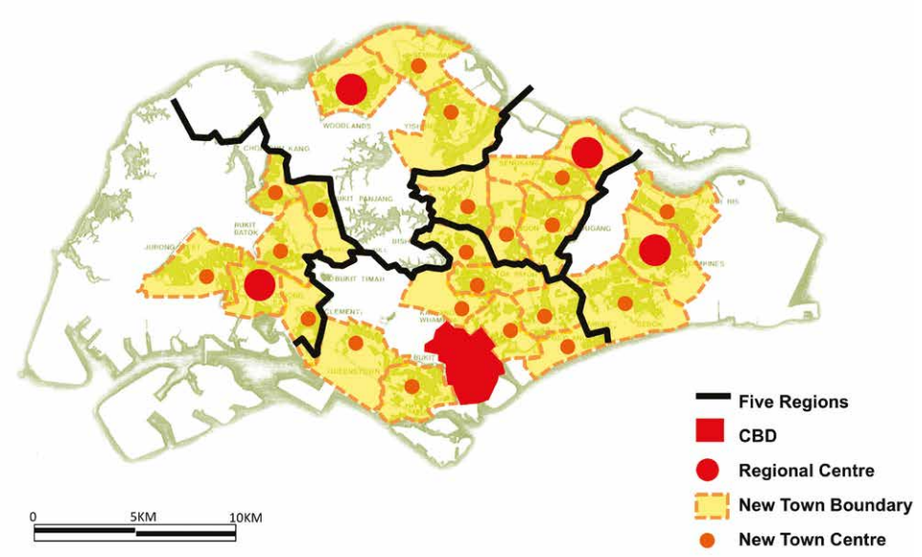


Image 12: Layer plan of Urban Cells

Source: Housing and Development Board, Singapore; Urban Redevelopment Authority, Singapore; RSP Architects Planners & Engineers Pte Ltd, Singapore

Urban Cells

In the planning of new areas, the first step is to identify the correct hierarchical level of the Urban Cell according to the Family of Cities concept mentioned in Image 7. In Singapore's Concept Plan 1991, the city was divided into five Regions, each of which could accommodate a population of approximately one million, similar to the size of Penang, Malaysia. Within these 5 Regions were 25 New Towns (Image 12) which were further subdivided into Neighbourhoods and Precincts. These living units, or Urban Cells, in varying hierarchical levels, each well-equipped with comprehensive amenities and convenient transport linkages, have effectively met the people's basic living needs.

System of Commercial Centres

The layer plan of Urban Cells (Image 12) clearly illustrates that every cell of every hierarchical level has its own centre, which means that there is a Neighbourhood Centre (NHC) for every Neighbourhood; a Town Centre (TC) for every New town, which also functions as an NHC to the given neighbourhood; and a Regional Centre (RC) for every region, which functions as a TC and NHC at the same time. In this way, living needs like shopping, social, cultural and sports activities are to be served by different levels of centres. Daily necessities are available in NHCs which are accessible by foot; higher-level needs at TCs or RCs which are accessible by bicycle or bus; leaving only the activities of the highest level for the CBD, which is accessible by the MRT, bus, or car. With this decentralised structure, the dual outcomes of greater living convenience to people and relief from traffic congestion are effectively achieved. Integrating the system of commercial centres with the respective facilities and utilities of different levels will enable Regions and New Towns to reach relatively high level of self-sufficiency.

It is understood that, in China, land area for commercial centres makes up a greater proportion of total urban land than in Singapore, and its distribution pattern is similarly at 4 levels: City, District, Residential District and Neighbourhood. Although population size is used as reference when planning for District level commercial centres, it is basically defined by the administrative boundaries evolved by historical causes instead of planning objectives. Districts vary dramatically in terms of area, population size, population density and land use structure, making the service coverage of District level commercial centres imbalanced.

Commercial centres at the Residential District level serve a smaller population than that of a New Town. They are therefore unable to support larger-scale and higher-end commercial activities to satisfy residents' living needs. Further, the layout of commercial zones in China, to a large extent, still follow the business pattern of traditional small towns, where commercial strips continue growing along with the roads. Roadside commercial activities work for traditional streets of a small scale with little traffic, whereas on busy arterial roads in urban areas, they cause traffic congestion and discourage pedestrian linkages for shoppers on both sides of the road. A shift in mind set is required here, to stop extending traditional linear commercial strips all over the city and instead install a hierarchical system of commercial centres concentrated on strategically designated land parcels, to facilitate commercial activities and flow of both pedestrians and vehicles.

Transportation Framework — *To Be Well-Integrated with Land Use*

Roads are the skeleton and blood vessels of cities, and its structure fundamentally affects the working of the urban functions. The transportation framework needs to be well-integrated with land use, and it is especially crucial for the rail transit network to connect the various levels of centres.

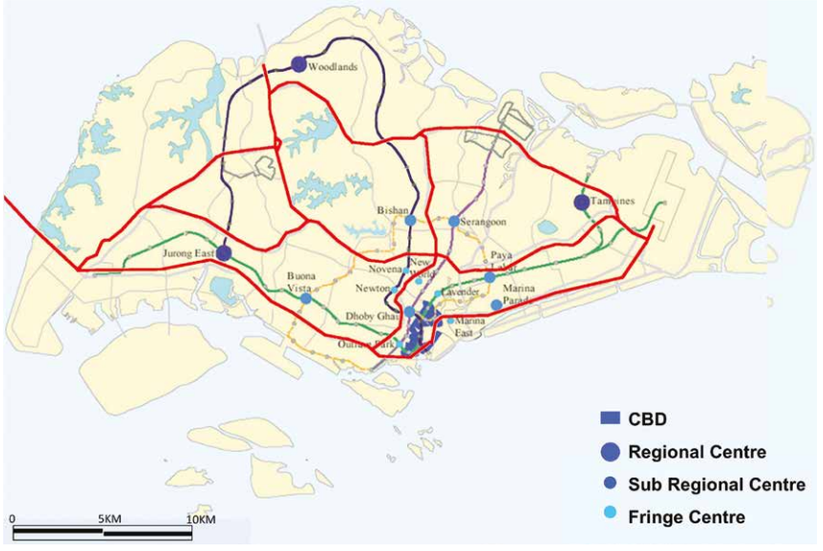


Image 13: Layer plan of transportation framework

Source: Urban Redevelopment Authority, Singapore; Land transport Authority, Singapore; RSP Architects Planners & Engineers Pte Ltd, Singapore

The higher the centre's level, the bigger the commercial quantum, the greater the complexity and volume of traffic generated. Hence, more rail lines would intersect and more interchanges are needed, to effectively gather and disperse the crowd in order to support the complex urban functions (Image 13).

Expressways must form a well-organised network and be appropriately spaced. I have asked some senior planners about the proper interval for expressways, and am surprised that few could provide an answer. A question arises, "How can urban transportation be planned well?" China has expressways in urban areas and it is very common to find it inappropriately spaced, while some are just widened arterial roads with road intersections and traffic lights. When the technical standards are not strictly adhered to, it affects the speed and flow of traffic.

Chinese cities, whether big or small, also tend to build ring roads. My personal view is that this system causes fewer cars to travel along the city's periphery, while the central area with fewer roads has more cars, which inevitably results in traffic congestion. During the 1960s, Washington, DC had been planned with a ring road system and later suffered the same fate. Beijing is another city currently experiencing the great pain of urban sprawl

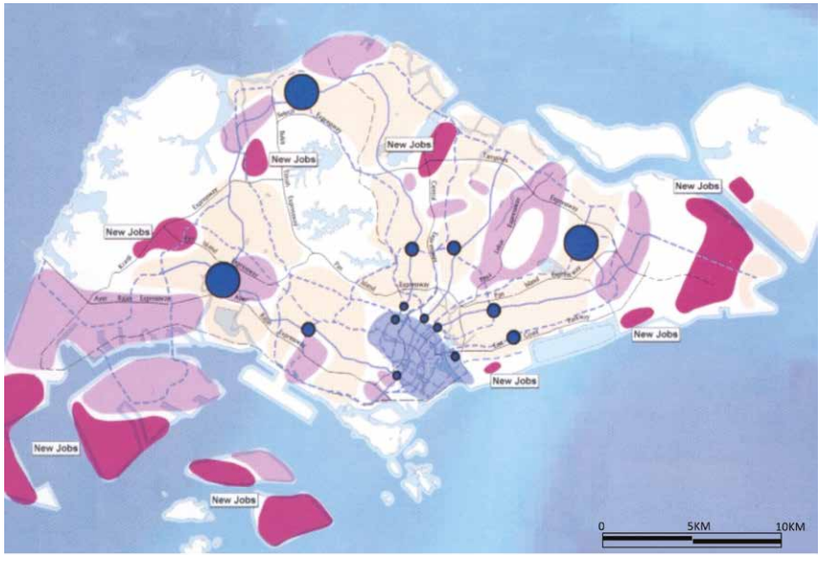


Image 14: Layer plan of Urban Organs

Source: Urban Redevelopment Authority, Singapore; RSP Architects Planners & Engineers Pte Ltd, Singapore

with its 6 layers of ring roads. Other US cities follow a grid-like road system as it offers more route options and flexibility, and does not easily lead to congestion. Roads in Singapore may appear winding, but are primarily based on the grid system.

Urban Organs

As with Urban Cell, the term "Urban Organ" and its concept were formulated when preparing the 1991 Concept Plan. In fact, a city works like the human body, where the heart, lungs, intestines, stomach and other parts are arranged with certain logic, and cannot be placed in an ad hoc manner. Other than the system of commercial centres, a city's primary Urban Organs include industrial areas, airports, sea ports and other key infrastructure (Image 14).

Singapore's Government, over the years, has paid particular attention to the site selection for each Urban Organ, trying to situate them in the most suitable location with minimum adverse effects. Oil refineries, for instance, are built offshore on Jurong Island in the west, in order to isolate them from densely populated areas; military training bases are located in tropical jungles beyond the north-western urban corridor. Although the Water

Catchment Area in the central region of the island was selected by the British colonial government, it was later further extended upwards towards the north by the Singapore Government to better satisfy the water supply needs. In the east, to allow for future expansion, the main airport, originally located within the Paya Lebar district, was relocated to the eastern tip of the main island at Changi, thereby reducing the area affected by noise disturbance and building height constraints, especially important for the central region.

The construction of utility facilities, including water, power, flood drainage, sewerage and telecommunications, must also be organised in accordance with the needs of the long-term plan, adopting standards based on future needs to determine location and scale. As much as possible, these facilities should be placed within industrial areas and hidden away from people's everyday lives to avoid disruption or the creation of visual blights. Just as a house with a living and a dining room needs a kitchen and a toilet, utility facilities can be effectively accommodated as long as engineers evaluate and plan diligently and methodically. Regretfully, in many cities, sewerage treatment plants often sit in wetlands; and electrical transmission substations, sewerage pump stations and refuse transfer stations are placed in parks; preventing people from enjoying the natural environment.

Furthermore, in many new urban areas, the distance between buildings along streets is too far apart, disproportionate to the human scale. This could be due to the following reasons. First, the ineffective public bus and rail transit planning and operations and inadequately dense road network result in overly wide roads assumed to be able to alleviate traffic congestion. Second, the utility pipelines are not laid according to standardised guidelines, encroaching on space far beyond the road reserve line, and in turn requiring larger setback distance for buildings. In fact, keeping those utility pipelines within the road reserve line is not technically impossible. It is just a matter of proper planning. Third, a misconception about image making for a modern city - that wider roads and taller buildings make a city grand. Fourth, to showcase the city's greening effort, creating wider green belts along pedestrian walkways on arterial roads in turn further enlarge the width of the street. Obviously, this is a waste of land resources which compromises both the convenience of pedestrians and the image of the street.

Public Facilities

Public facilities refer to the education, culture, healthcare, sports, religion, recreation, parks and tourists amenities which improve daily lives and optimise living conditions. In Intelligent Planning, these facilities are distributed based on the hierarchy of Urban Cells from City to Region, New Town and Neighbourhood, according to the population size at each level to determine the provision quantum and land area required, as well as the best spatial arrangement.

In China, like commercial centres, the provision of public facilities requires standardisation. It is noteworthy that the recently completed Zhuhai Concept Plan has received encouraging support and appreciation from the local government and planning authority, gaining legal position locally to be complied with by all subsequent lower level plans. The city's latest *Urban Planning Technical Standards and Guidelines* also reflect many fundamental principles and concepts from the Concept Plan I prepared. I have been further sharing the Singapore experience in Intelligent Planning through two model New Town projects, to demonstrate how the planning principles of the Concept Plan could be carried out during the subsequent processes of detailed planning and urban design.

The Concept Plan

The Concept Plan demonstrates the relations among various urban components within an overall urban structure. To this end, specific components must be quantified and laid out according to their specific planning parameters, with all individual systems overlaid into an overarching whole. A city is a machine for living and has a life of its own. It is like the human organism, a sophisticated composition of the skeleton, muscles, cells and various organs, which are parts that cannot be put together in an ad hoc manner. The green-blue system and transportation system constitute the urban framework; the Regions, New Towns and Neighbourhoods the Urban cells; the system of commercial centres, industrial land, airports and so on are its key Organs; together with utilities, the various systems with various hierarchical tiers are integrated to constitute the final Concept Plan (Image 5), which henceforth sets the spatial strategy for long-term urban development over the next 50, 60 or even 100 years.

This approach to planning defines the spatial strategy for long-term urban development, and is intended to enable implementation rather than market fashionable concepts. My Chinese clients often find the process very tedious, as we need to communicate extensively to confirm the accuracy of the information received, observe the workability of land, roads and facilities and plan for phased development. The principles of planning and the integrity of

the system must also be adequately conveyed. In doing so, we try to avoid being distracted by sexy ideas, theories and slogans that have not been put to the test. Importantly, we must take responsibility for the lives of millions and the sustainability of the vast land inevitably affected by our actions.

To effectively carry forth the macro vision and goals of the 1991 Concept Plan into the micro implementation plans, and to maintain specific and transparent objectives while minimising ambiguity for ease of implementation, the entire island was carved into 55 planning units, each with its own Development Guide Plans (DGP). According to the planning parameters of the Concept Plan, we spent five years preparing Detailed Plans for each New Town which was used as the basic planning unit of the DGP. With considerations for the specific circumstances and land ownership, plot-specific planning parameters for each land parcel within these planning units are determined, including land use, development intensity, building height and building setback line. Together, the various DGPs were incorporated into the statutory Master Plan, which provides the legal base for executing and administering the plans. Planning in Singapore is thus able to balance both the long-term urban development goals and the equitable interests of private land-owners.

The Master Plan

Singapore's Master Plan translates the broad and long-term strategies in the Concept Plan into a more detailed and specific statutory implementation plan for development over the medium- and near-terms (50 years, 30 years, and 10 years) . As a mechanism to respond to the current development and future trends, while keeping with the framework of the Concept Plan, rules and regulations are constantly updated, with the Master Plan reviewed every five years for minor revisions, and every 10 years for major revisions, while ensuring that the fundamental planning principles and structures remain constant.

Central Business District — *The Captain of Commercial Centres*

Apart from the Concept Plan, another important aspect of planning is the separate studies of key urban areas, such as the Central Business District (CBD).

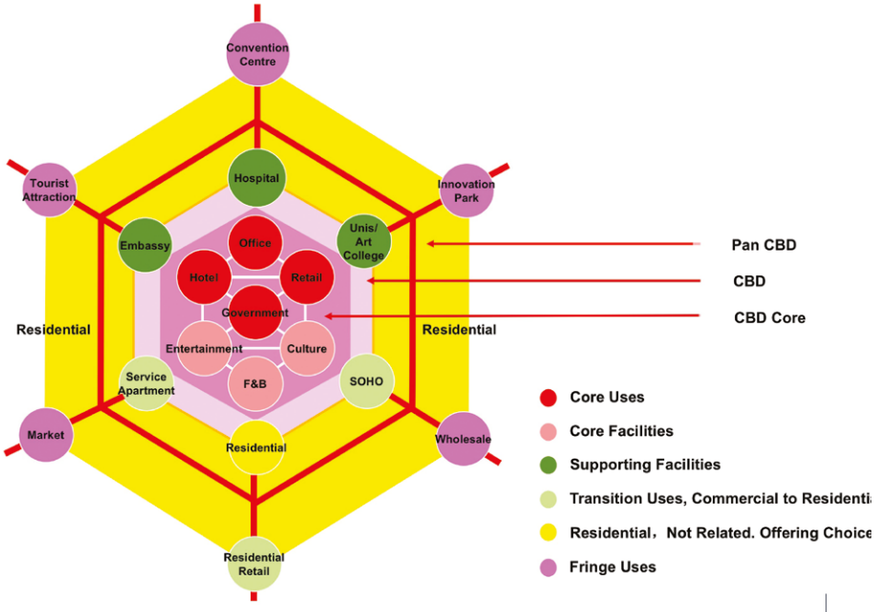


Image15: The prototype of Central Business District

The Planning Prototype

The CBD also conforms to a certain planning prototype (Image 15). Its major functions are business and administrative offices, retail and hotels, being complemented by major amenities such as cultural and entertainment facilities, with residential area on the outer perimeter. Many experts believe that only by having residential components can the CBD be vibrant. I disagree. Although it is true that the CBD should be full of vibrancy day and night, the key has nothing to do with the presence of residences but lies in the appropriate blend of urban functions and the proportion of development quantum. I have studied this issue in depth whilst working in the Government.

The Image of a City

We often hear people say "Paris is very beautiful". This is, in fact, not completely true. It is not that I do not like Paris, but the outskirts of Paris are not necessarily very beautiful. Yet people still find it a beautiful city. Why? It is because the central area of Paris is very beautiful. Thus, so long as the centre is beautifully developed, people will have the impression that the city is beautiful even if its outskirts are very ordinary. In contrast, if the city centre is

tastelessly assembled, no matter how gorgeous the outskirts, the perception of the city would not change. Therefore, if planners want to have a good image of the city, the key would lie in creating an impressive CBD. Surely, I would nevertheless suggest diligently ensuring that other areas are beautiful as well.

The Heart of a City

The CBD is the primary driver of the tertiary industries, where the government agencies related to commerce, headquarters of international and domestic enterprises, high-end service and retail complexes are concentrated. The public and foreign visitors definitely visit the CBD for business or shopping. To create a successful CBD, it is necessary to have the important transportation network such as expressways and rail transit lines converge in this centre, just like the relationship between the heart and the major and minor blood vessels. That is why the site selection for the CBD and its relationship with the entire transportation system must be thought through concurrently during planning.

The Activity Centre for Citizens

The CBD is a place where projects and facilities of the highest level are concentrated. It is also home to important cultural facilities, parks and plazas, like a city's living room, being the most important arena for civic activities. This is the reason why we celebrate the National Day, New Year's Eve and other major occasions in the CBD here in Singapore. Over time, a virtuous cycle forms, making land in the CBD naturally the most expensive in the city. All things considered, the CBD has to be intricately calibrated.

However, other centres outside the CBD, which are systemically distributed throughout the city, cannot be neglected. Not only do they provide convenience for the people, but also effectively alleviate the traffic pressure within the CBD by filtering out unnecessary flow of crowds and cars. Commercial centres, in terms of spatial profile, are also the important places representing the concept of a "City". Whether in ancient or modern times, hustling and bustling streets, congregation of businesses and vibrant crowds are the typical features of vibrant commercial centres. But in the many cities that I have been to, including Chinese cities, those business or commercial centres that I have seen hardly belong in "Cities", but in "Suburbs". This is because the gaps between buildings are too large, resulting in the emptiness of urban spaces, lacking an intimate street scale where the buildings become companions to the pedestrian. Instead, people often have to hop onto a vehicle to go from one building to another. An area that lacks Walkability is not a "City".

Satellite Towns (New Towns) — *Singapore's "Open Secret Weapon"*

During the early years of independence, the Singapore Government set out immediately to address housing needs, not only providing a home for everyone, but also looking into the quality of the overall living environment. To do that, we had to make two bold decisions that went against the world trends.

First, building high-density high-rise is the only comprehensive solution to housing a large population on scarce land. During the 1960s and 1970s, high-density high-rise public housing was not endorsed by Western experts because in the West, low-income groups gathered in such areas and massive social problems emerged. Therefore, the task in Singapore was to study the problems engendered by this housing-type, and to overcome the problems through improved urban planning and building design, and by supplementing such effort with people-oriented administrative systems and laws.

Second, deciding in as early as 1964 that public housing would not only be for rental, but also for sale to residents. During that time, and even till today, many governments put public housing up only for rental. The decision to promote home ownership was inspired by three factors: first, to encourage residents to care more for their living environment; second, to allow residents to improve their housing conditions according to their preferences when their financial circumstances improve; and third, to increase the sense of belonging and patriotism.

Satellite Towns (New Towns) are Singapore's biggest "Open Secret Weapon". It is something that Singaporeans have never contrived to conceal. This secret is being shared with other cities openly; however, few have tried to carefully understand the key aspects of the policy and its success. One of the core concepts of Singapore's public housing is the Satellite Town. In urban planning, a Satellite Town generally refers to a small town located at the fringe of a metropolitan area. In Singapore, however, a Satellite Town, or a New Town, is an important planning unit embedded within the city. It is the city's basic building block. The better the building block, the more liveable the city.

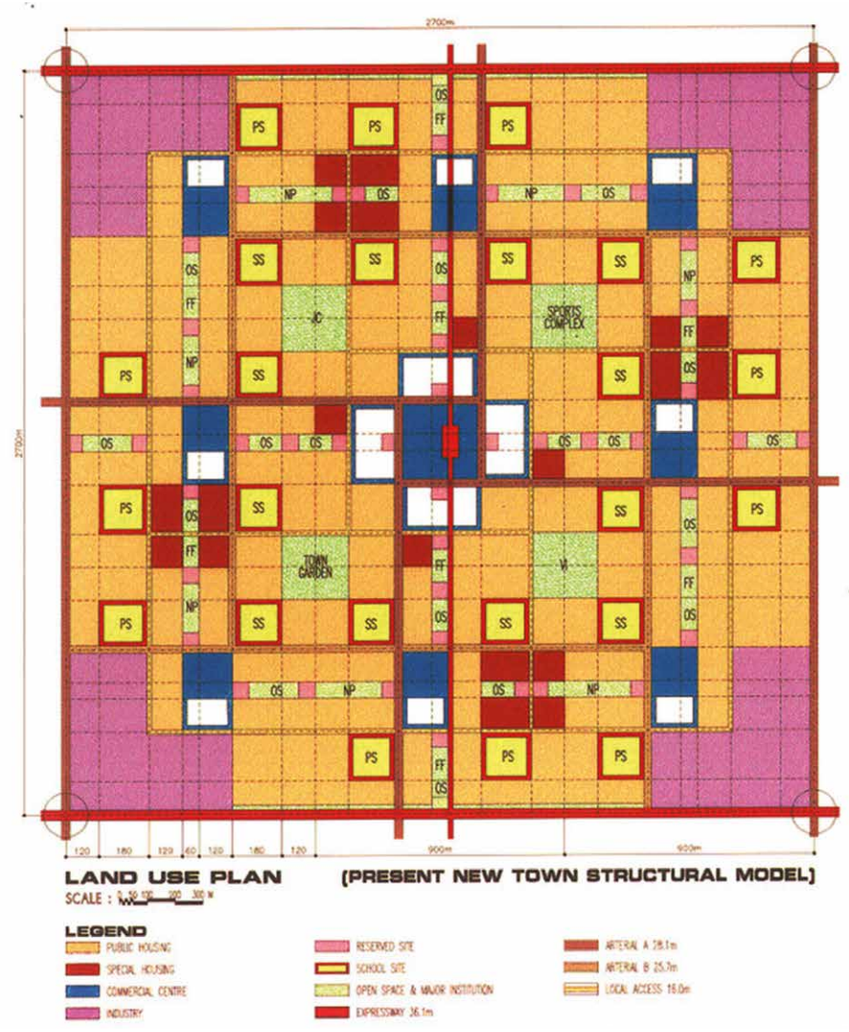


Image 16: The prototype of New Town

Source: Housing and Development Board, Singapore

Based on practical experience, we concluded that the planning prototype for New Towns should consist of the following attributes (Image 16): a minimum land area of 15 sq km and a population of about 200,000 persons. Residents are served by a Town Centre and a number of Neighbourhood Centres, and Precincts also have activity centres encouraging community interaction. The road system consists of major arterials, minor arterials, and local roads, with limited connectivity to adjacent New Towns. New Towns are usually flanked by expressways and the MRT traverses the Town

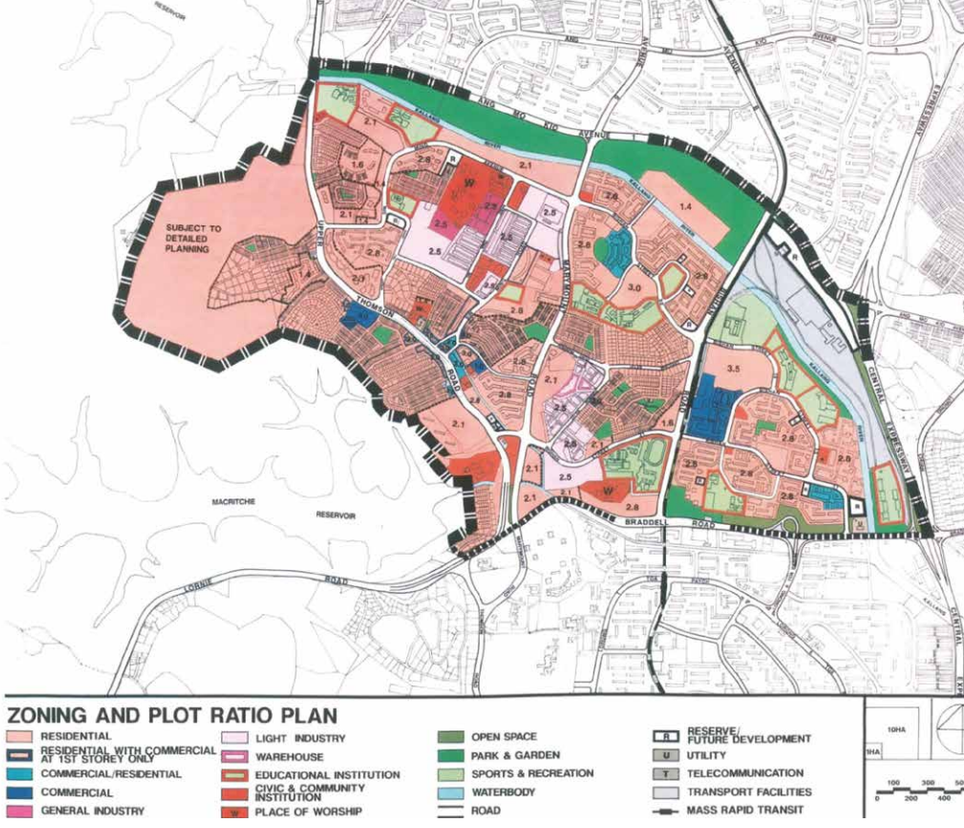


Image 17: Detailed plan of Bishan New Town

Source: Housing and Development Board, Singapore

Centres to serve its high-density population. Parks and green spaces in New Towns are distributed at the Town, Neighbourhood and Precinct levels, most of which are connected by linear public green belts, which in turn link up the nearby large public or green spaces to form ecological and recreational green corridors that meet the ecological, leisure and walking needs.

A certain percentage of the land is reserved for non-pollutive industries located at the fringe of a New Town. These could be high-tech or general light industries, such as vehicle maintenance and repair, or even food factories. This arrangement provides job opportunities close to homes, thereby reducing daily long-distance commute, preventing traffic congestion. It can be said that the prototype of Singapore's New Town manifests the ideal principles and relationships of functional space within a self-sufficient urban living unit. When such a prototype is applied to the actual site to blend in with the local historical and geographical characteristics, each of them can look very different, as shown in the Bishan New Town Plan (Image17), which is highly unique despite being a typical New Town.

In Singapore's Concept Plan, apart from setting the general direction for employment, education, housing, transportation and so on; in terms of public facilities, at the City level, provisions of universities, public libraries, cultural facilities are all put in place according to planning principles and parameters. Over time, these facilities are upgraded to world-class standards. Esplanade Theatres on the Bay has become an important venue hosting some of the best artists in the world, and the newly-opened National Gallery of Singapore has a permanent display of the works of Singaporean and Southeast Asian artists.

At the New Town level, amenities near the living areas are continuously being upgraded in order to improve the quality of the people's lives. To retain the traditional lifestyle, hawker centres and wet markets are necessarily provided. Just like Paris' outdoor cafés, al fresco food courts and coffee shops have come to symbolise Singapore's traditional lifestyle, giving the people a local character and sense of familiarity. Each New Town is also equipped with a town-level sports complex, which includes an outdoor stadium, an indoor gymnasium, an Olympic-size swimming pool as well as different types of sports clubs.

Key Aspects of Intelligent Planning

To plan well and to establish an Intelligent Implementation mechanism to bring the plan to life, political leaders and planners need to develop three tenets to capture the essence of urban planning (Image 18):

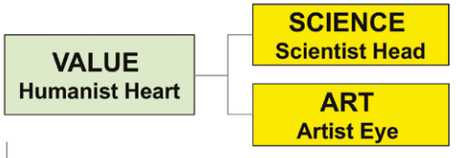


Image 18: Three tenets of planning

First, the Heart of a Humanist — to set the vision that values livelihood and land. This vision calls for being both far-sighted and pragmatic. Political leaders need a better understanding of urban culture and give priority to people's livelihoods and land ecology. Indeed, I do understand that local officials in China, as with Singapore, are under pressure of developing the economy to increase incomes. However, before pushing for economic growth, settling the livelihoods should be the priority, including basic housing, transport and education needs. This is the Heart of a Humanist. If the issue of people's livelihoods and society are addressed in view of the city's long-term development, the economy will prosper more as a result.

Second, the Head of a Scientist — to treat planning as assembling a large machine for living. To build a robust machine, we need to know the requisite parts and their respective quantities and sizes. In planning, it means knowing the types of land use and transportation system, and its spatial relationships, which are the most basic aspects of planning. I have done many studies in these areas. Recently, the international discussion topics on planning have focused more on neighbourhood planning or ecological protection. Perhaps this is because, after the World War II, few Western cities have planned for and developed at the scope, scale, built-up density and speed that Asian cities have. Nonetheless, urban planning cannot be substituted by urban design. Good urban planning requires solid technical skills and extensive knowledge. There is a set of comprehensive and systematic approaches and principles to explore, study, and observe. So, what catastrophes could befall if the living machine is deficient? I would say haze, traffic congestion, floods and other urban ills. Hence, the precision of the machine is critical.

Third, the Eye of an Artist — to romance with the land. Planners need to leverage on their art appreciation abilities to create an urban environment in harmony with the nature and history. Planning requires thoughtful considerations for fitting the New Town comfortably into its existing natural topography, by carefully adjusting building plot ratios and building heights to create a beautiful urban skyline. This means both functionally logical and sound, and environmentally pleasing. For instance, it is recommended to select a scenic route exposing the natural beauty of hills or rivers within the city when planning a road. What if a planner does not fall in love with the land? The entire city will fall into disorder, just like graffiti. Will a planner with a university degree, even one with a PhD, do things that destroy the environment? Well, inconceivable things often happen in the real world due to lack of awareness.

In addition, planners need to master the philosophy of planning and design. When I was a student in architecture, we were taught: Form Follows Function. In other words, architectural designs must respect the requirements of use. In fact, I would suggest that the word Form applies to both architecture and city planning. A clear and rational plan would have embodied the notion of Form. The purpose of Function, it would seem to me, is to help people have a Fun experience in a city or a building. We could therefore rightly say: Form follows Function follows Fun. In this case, Fun is related to Value, Function to Science, and Form to Art. However, I am concerned about the prevailing trend today, both in

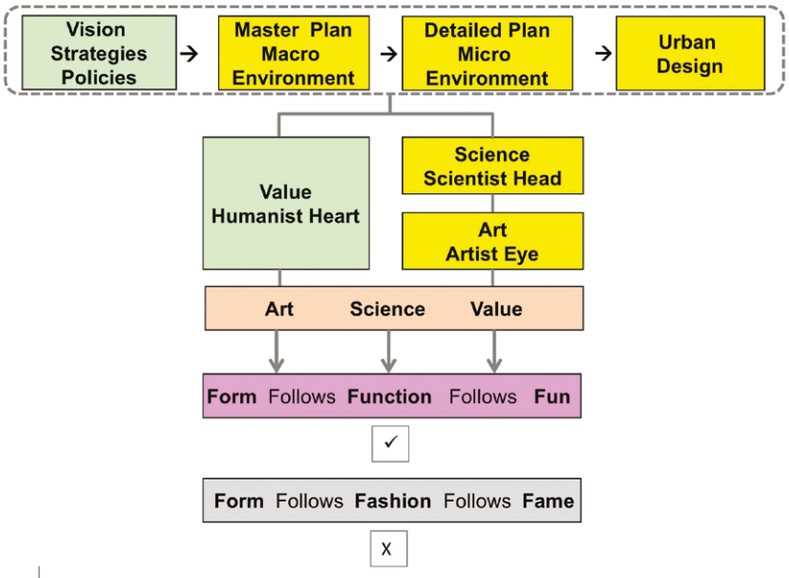


Image 19: The philosophy of planning and design

architecture and in planning, which tends to be: Form follows Fashion follows Fame (Image 19).

In other words, if a person plans a city or designs a building according to the prevailing fashion, he is more likely to enjoy instant fame. This is certainly very tempting, but it is not necessarily done in the best interest of the people or the land. The word Design to my mind suggests producing a clever yet simple urban solution which is convenient, comfortable and easy to use and yet can satisfy the complex needs of our lives today. This is not unlike the work of a doctor. Having felt the pulse of the patient, he would have to find the single most appropriate medicine or surgery to help the patient become healthy and beautiful again, with minimum fuss.

Architectural design from the perspective of city planning: a plan is a platform and a framework, within which is architecture — one of its key constituents and a factor that directly influences the impressions of a city. In the recent decades, China has been the world's largest construction site, and it has an incomparable construction volume by any country's standard. Unfortunately, China has much to work on in terms of Form, Function and Fun.

A point to note here is, Asia accounts for 60% of the world's population, but only 30% of its land area. Population density in Asian cities will be generally higher, and the world's economic engine will shift to Asia. A country that has economic power can afford to pay for construction, and its people will have the means to improve their lives. Asian cities can then be more sophisticated and modernised. However, as cities develop massively to pursue modernisation, whether in Singapore, China or any other Asian cities, we should proceed with greater pride and confidence, that is, the design of city and architecture should strive to be modern yet with national character and local flavour.

Lu Xun, a famous Chinese writer, said a long time ago, "Only the truly local is truly international" ("只有民族的，才是世界的"). Visitors from Western countries love the dilapidated and old Chinese buildings; however, these treasures are not appreciated by Asians themselves. At this moment, in China, no matter how grand the Western style of architecture is, it will lag behind the West. China needs to develop her own architecture. I really admire Australian architects, who may be Westerners, but created their own architectural style, different from that of America or Europe.

In fact, traditional Chinese architecture is highly scientific, thus appreciably unique. For instance, courtyard houses can be found in both Beijing and Athens. As both are on the same latitude, a similar courtyard structure had been developed in response to the climate. Also, in terms of the road system serving traditional districts in Beijing, by my observation, there are interestingly more east-west oriented roads with smaller spacing, which allows more buildings facing the south to enjoy longer hours of sunshine. On the contrary, north-south oriented roads are few and far between; thus, the cold north wind does not blow through easily. In the past, without today's advanced technology, people relied on diligence and wisdom to study geographical and climatic conditions and produced the most liveable and rational designs. In addition, architectural design also involves cultural factors. For instance, the proportions of the traditional Chinese door and window are much different from the Western golden ratio of 5:8. And, Chinese architecture also stresses the harmony and balance of the Positive and Negative Energy (yin-yang), and the unity of the Soft and the Hard Strengths. I wish that architecture students in China could learn, besides textbooks on Western architecture theories, more about Chinese architecture theories to imbibe and advance China's own planning and architectural culture.

Outline of Singapore Planning Experience

Intelligent Planning Principles

Singapore's planning approach emphasises being intelligent and rational. In terms of the planning process, a few key principles need to be observed. First, from Far to Near, it means considering the long-term strategies before the short-term. Second, from Big to Small, that is to study the larger area first before focusing on a smaller area. Third, from Bottom Up, that is basically to stress function before beauty, and infrastructure before image. Fourth, plan according to needs, not to capacity. For example, if an expressway was erased from a plan because of the lack of funds; by the time the funds become available, there would be no land left for that expressway. Instead, the same expressway should be kept in the plan, with reserved land marked for future development.

During the mid-1980s, many visitors to Singapore thought that the city looked like a hospital — dull, prosaic and lacked energy. I told my colleagues that we must build a city that breathes with life and vitality while nurturing inner beauty. If we had listened to foreign experts and rushed to be a superficial wannabe-city, it could have deteriorated into a theme park which is not the environment we want our people to live in every day.

Planners must try to get the basics right, to fix the cause instead of treating the symptom; to conserve natural resources before constructing; to take care of the functions before building the image; and to improve the urban health before considering the urban character. Today, no one would say that Singapore resembles a hospital.

Clear Determination of Government's Role and Obligations

Singapore's first-generation government officials would invariably search for the root causes whenever they encountered a problem, analyse it to seek clarity, and find solutions that fix the causes instead of treating the symptoms. This gave them the mettle to implement the solutions well. For the past 40 to 50 years, this working spirit can be described as:

Clarity = Courage

As illustrated in Image 20, policies originate from two sources: the political leaders and the professionals. A government needs to clearly

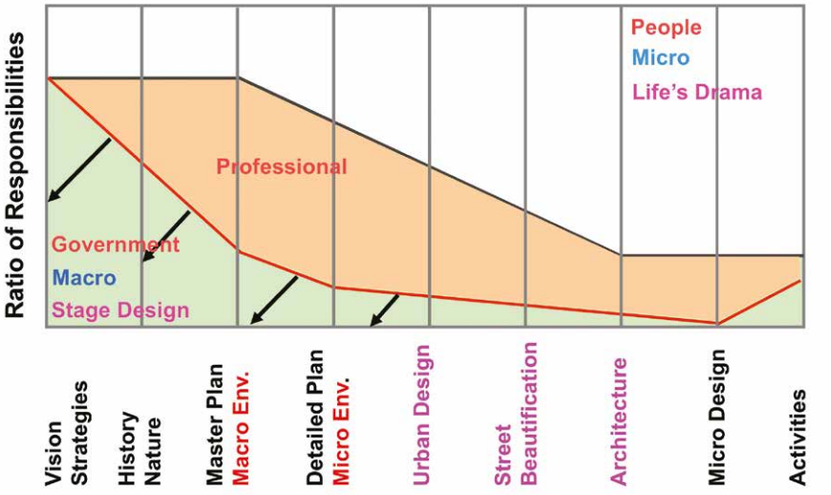


Image 20: Roles and obligations between government and the private — Ideal healthy allocation

understand the division of the roles and obligations between itself and the professionals, and is expected to shoulder the socio-economic, ecological and environmental responsibilities, set goals and strategies, and develop rational policies for matters such as conservation. They also need the support and close cooperation from the professionals to prepare plans for development such as the Master Plan for macro environment, Detailed Plans for local environments like Towns and Neighbourhoods, and Urban Design, as well as road beautification and architectural design and so on. At the same time, the general public can also give suggestions for urban environment and image, and may focus on contributing more to the finer and detailed designs as well as organising various civic activities. The government does what it should do, and then leaves the downstream development of individual projects to the competent hands of the citizens and entrepreneurs. The government needs to boldly take up the bulk of responsibilities, allocate tasks properly, to create an excellent stage in the city, on which citizens lead meaningful lives, completing the picture. In short, from macro and micro, the government should share the responsibilities with the public appropriately.

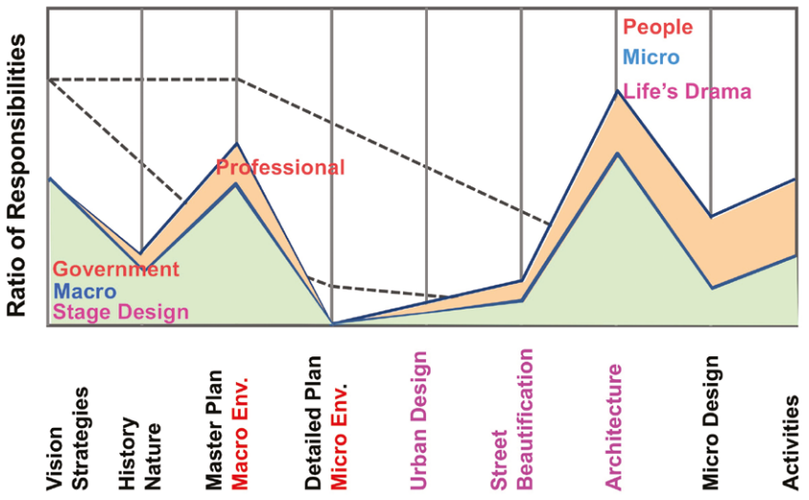


Image 21: Roles and obligations between government and the private — Real-life unhealthy allocation

Unfortunately, many political leaders and mayors are so involved in architectural design that they have little time or energy to review policies. In this situation, how can businesses grow without a clear policy direction? The entrepreneurs would then do as they deem fit, resulting in disorder with the system in disarray, and the urban environment and its functions inevitably becoming chaotic (Image 21).

Whole-of-Society Efforts – Hard Work Paid Off

Singapore's urban planning and development journey has continued for more than 50 years. In retrospect, the most impressive aspect is having taken the correct step right from the start. We focused on resolving real problems to meet the basic needs of the people and the land, and never allowed ourselves to be distracted by vain projects. Meeting basic needs is a dull and tedious enterprise. Chasing vanity, on the contrary, might allow one to collect transient praise, and is perhaps relatively easy. The current trend is to look to the future, but how can this be done without first understanding the past and the present?

The arduous urbanisation journey of Singapore can be summarised in Image 22. Above the sea level is only the tip of the iceberg, which can be easily seen and appreciated. The bulk of the iceberg lies beneath the

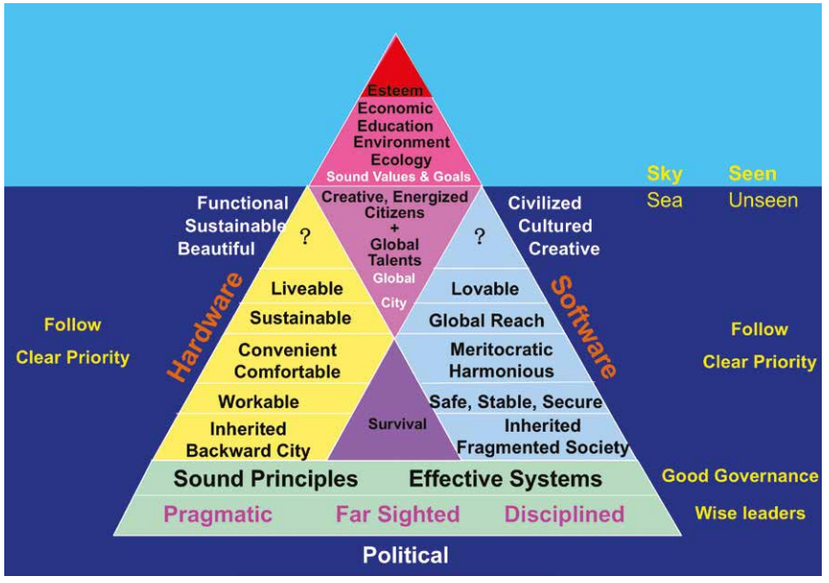


Image 22: Process of whole-of-society efforts

sea level, which cannot be readily noticed, its existence unknown. In the beginning, the Government was concerned with the issue of survival: how could this tiny island, with multi-ethnic groups, without any underground resources or a sense of nationhood, survive? To make matters worse, the industrial and service sectors were practically non-existent. But survive we must. It was not a choice. The Government, according to urgency of needs and availability of resource, then set the goals and priorities for the hardware development of the physical environment and software development of the social-cultural environment, and the country moved forward steadily. By 1985, Singapore was recognised by people around the world to be a modern metropolis. Today, not only have we gained a strong sense of nationhood, but we have also managed to nurture a creative and highly energised citizenry which in turn attracts talents globally to work and live in Singapore. We are also frequently applauded for remarkable achievements on economy, environment, education and ecology. Most importantly, the highest reward is to have earned the unconditional esteem from people around the world. In recent years, the ecological environment has been rated as the best in Asia, and the city the most business-friendly in the world. Night life in Singapore has also been ranked second globally, and it is the happiest country in Asia.

Singapore has a prosperous and vibrant economy, and as much as 95% of residents in public housing are satisfied with their living conditions. Although the current population density has more than doubled since the 1960s, with the well-created environment, it does not feel crammed and crowded. It is important to understand that a high population density does not necessarily imply that the urban environment cannot be done well. I do not accept this thought at all. The reverse has been proven by Singapore's experience. We have limited land but the city functions well, and people have plenty of choices. No one would ever imagine that Singapore has 30 golf courses and 10 airport runways. So how does this tiny little island accommodate all the functions necessary for running a city and a country? A large part of it is due to intelligent and rational planning.

Planning Projects in China

Over the past 30 years, I have completed projects that cover more than 30 cities in China, spanning nearly all the major coastal provinces and cities, with key development regions in western China (Image 23). This work involved research of various planning scales and levels as shown in Image 24. To provide an overview, I have selected some recent cases for elaboration in the following section.

Constellation Cities

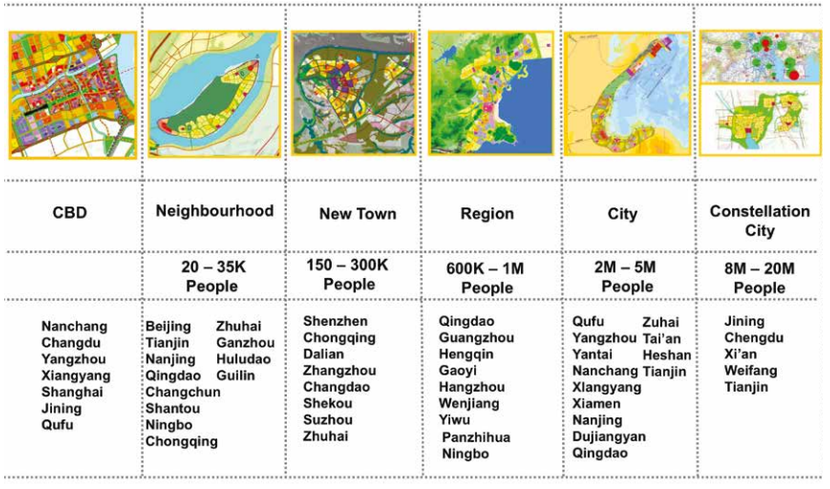
As mentioned earlier, the planning concept of the Constellation City is generally applicable to Chinese megacities due to its population size.

• Xi'an-Xianyang, Shaanxi Province •

Local features: In the north of Xi'an and Xianyang and along Weihe River lies a 70km belt of historical sites which is probably no less important than the pyramid belt along River Nile in Egypt. At present, careful conservation of this historical belt is still not too late, though it has been cut through in several places by railway lines and highways, causing some damage. Hence, for this project, future railway lines and highways cannot be allowed to cut across any historical site.

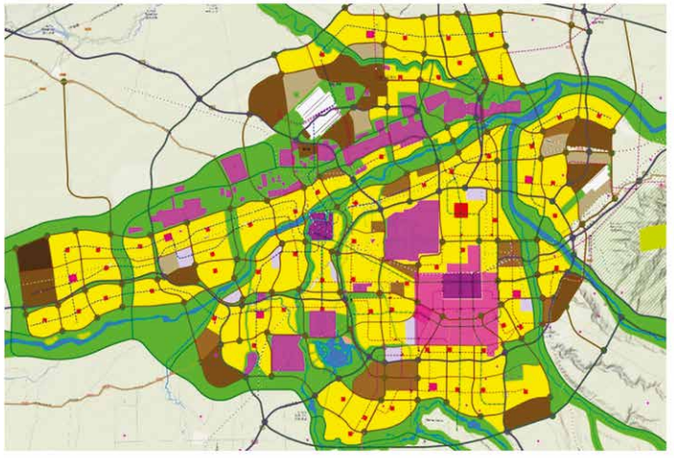
Planning structure: Current Xi'an central city has an existing population of about 6.5 million and an urbanised area of 580 sq km. There is no space for further urban expansion. Since Xi'an and Xianyang are closely related historically and also share the same airport, together with China's national

Image 23: Distribution of China projects
Source: RSP Architects Planners & Engineers Pte Ltd, Singapore



CBD	Neighbourhood	New Town	Region	City	Constellation City
	20 – 35K People	150 – 300K People	600K – 1M People	2M – 5M People	8M – 20M People
Nanchang Changdu Yangzhou Xiangyang Shanghai Jining Qufu	Beijing Tianjin Nanjing Qingdao Changchun Shantou Ningbo Chongqing Zhuhai Ganzhou Huludao Guilin	Shenzhen Chongqing Dalian Zhangzhou Changdao Shekou Suzhou Zhuhai	Qingdao Guangzhou Hengqin Gaoyi Hangzhou Wenjiang Yiwu Panzhihua Ningbo	Qufu Yangzhou Yantai Nanchang Xiangyang Xiamen Nanjing Dujiangyan Qingdao Zuhai Tai'an Heshan Tianjin	Jining Chengdu Xi'an Weifang Tianjin

Image 24: Types of Chinese projects
Source: RSP Architects Planners & Engineers Pte Ltd, Singapore



Planning period: 2010-2060

Proposed population: 11.50 million

Planning area: 1800 km²

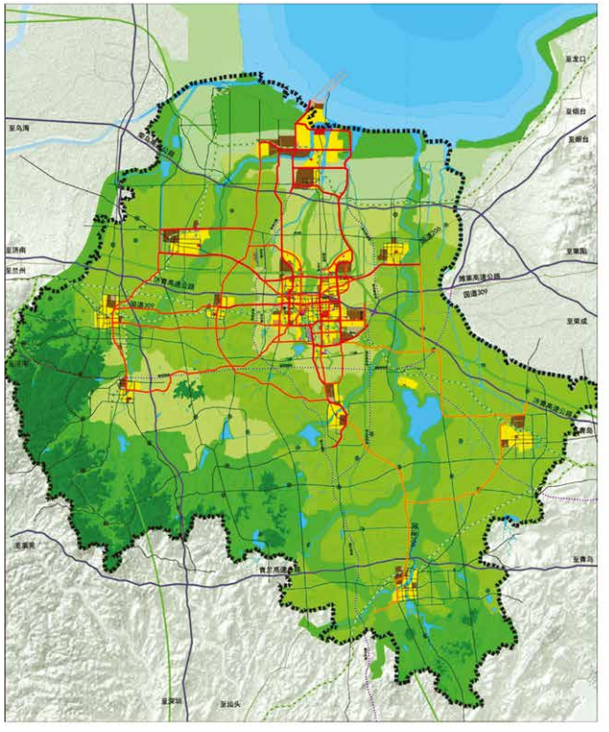
Urbanisation rate: 80-85%

Image 25: Constellation City — Greater Xi'an Concept Plan
Source: RSP Architects Planners & Engineers Pte Ltd, Singapore

policy for this region, Xi'an-Xianyang has been planned to be a Constellation City comprising two cities — Greater Xi'an. The planning period is 50 years (2010 to 2060), with a proposed population of about 11.5 million distributed into the two cities and several surrounding regions. The total urban development land area is approximately 1,800 sq km, including historical sites and the ecological environment (Image 25). The urban functions and transportation system of the entire region have been systematically arranged, with reserved land set aside for future expansion of the main industrial parks and the airport. A detailed urban design is provided for the new CBD as well. In this way, the urban system of Xi'an is better rationalised. Given that Xi'an is far better endowed than Singapore in terms of natural resources, it should do better than Singapore in urban development if the planning work could be properly done. Although I am a Singaporean, I sincerely wish that Greater Xi'an would do better than we have.

• Weifang, Shandong Province •

Local features: Weifang, located in the central area of Shandong Peninsula, is the important birthplace of Luzhong Culture, and internationally acclaimed as the City of Kites. For a long time, Weifang has been the east-west land transportation hub for the peninsula. Given its strategic location of facing the Bohai Sea in the north, it has a distinct advantage in marine chemical engineering and water — land transhipment. In addition, being situated at the intersection of the Yellow River Delta High-Efficiency Eco-Economic



Planning period: 2010-2070

Proposed population: 11 million

Planning area: 1260 km²

Urbanisation rate: 75-85%

Image 26: Constellation City — Weifang Concept Plan
Source: RSP Architects Planners & Engineers Pte Ltd, Singapore

Zone and Shandong Peninsula Blue Economic Zone enables Weifang to benefit from both policies, and together with its broad and flat expanse and increasingly sophisticated regional transportation facilities, Weifang should take this opportunity to improve its urban development, with appropriate consideration of farmland protection and ecological conservation.

Planning structure: The Concept Plan covers an area of approximately 16,000 sq km, known as Greater Weifang, with an existing population of about 9.2 million. The plan aims to guide the urban development for the next 60 years (2010 to 2070), with targeted urban population of approximately 11 million and total urban development land of 1,260 sq km. According to the current spatial distribution of population and economic landscape of various cities and counties within the planning boundary, a smaller type of Constellation City concept was applied, based on urban functions, to form a planning structure consisting of two cities, eight regions and one satellite town (Image 26). Among them, Weifang central city is within a half-hour

drive to peripheral cities such as Binhai, Shouguang, Changyi, Changle, Anqiu and Xiashan, and further grouped to be a "1 Core, 7 Cities" structure, which are interconnected by expressways and rail transits. This way, essential farmlands between cities can be protected and the urban functions of each city or county are clearly defined within the region, eventually preventing urban sprawl. As for industry, while further strengthening its position as a manufacturing base, the plan emphasises leveraging on its advantage of being both a regional logistics hub and a logistics base.

Cities

• Zhuhai, Guangdong Province •

Local features: Picturesque Zhuhai is the gateway city on the west bank of the Pearl River. It is also a Special Economic Zone that borders Macao by land and looks across to Hong Kong to the east. By virtue of the industrial relocation process within the Pearl River Delta region and the building of the Hong Kong-Zhuhai-Macao Bridge, Zhuhai is confronting tremendous development opportunities to reverse its long-time disadvantage of being the end-point in the region's transportation network. At the same time, Zhuhai has a distinct urban environment, with rivers criss-crossing, hills stretching far and wide, and a vast countryside — all of which must be carefully protected through planning.

Planning structure: The Zhuhai Concept Plan covers an area of 1,700 sq km, with an existing population of about 1.6 million and an urbanised area 280 sq km. With a planning period of 50 years (2010 to 2060) and a projected urban population of about 6.37 million and an urban development land area of 690 sq km. It is planned according to the prototype of an independent City, equipped with complete functions. Bearing in mind the city's natural landscape and current state of affairs, the city is functionally sub-divided into six Regions and 26 New Towns. Seamlessly coordinated with the expressway and rail transit network, all commercial centres of various levels are well served (Image 27). The plan integrates existing developments scattered along coastlines with roads as an organic part of the whole, and designates the core of Hezhou area, located in the centre of the city, to be the future CBD so as to better serve the entire city. At the Master Plan level, respective plot ratios and building heights are also quite clearly provided to ensure a comfortable urban scale.

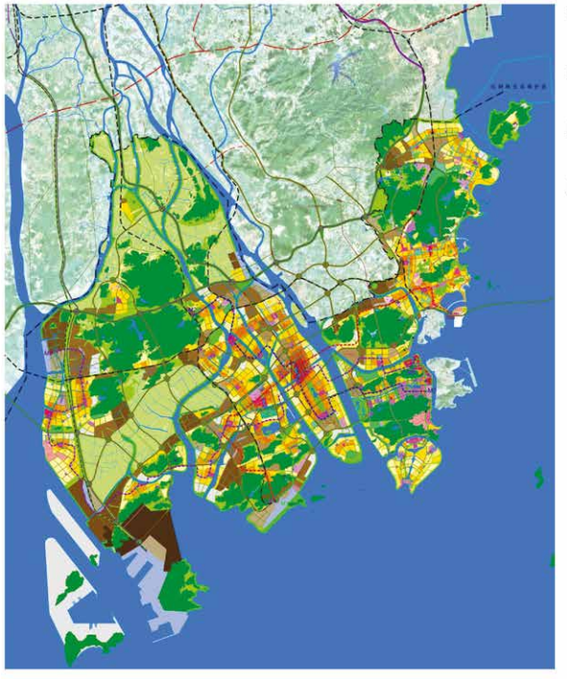


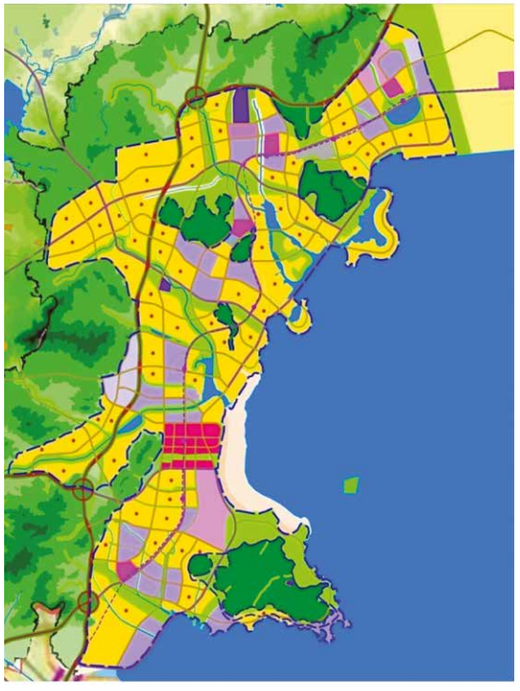
Image 27: City - Zhuhai Concept Plan
Source: RSP Architects Planners & Engineers Pte Ltd, Singapore

Thanks to the leaders and planning authorities of Zhuhai, who show great determination in implementing the Concept Plan by creatively legislating through the local People's Congress, the Zhuhai Concept Plan is now the city's "Mother Plan" for all levels of subsequent Detailed Plans. Following the legislation effort, a series of corresponding work such as revision of the Master Plan and research of the rail transit system has been carried out to actualise the concept and principles set forth in the Concept Plan.

Regions

• Qingdao Blue Silicon Valley, Shandong Province •

Local features: Located in Qingdao, Shandong Province, the Blue Silicon Valley is a scenic and charming region, with a fairly established transport system. It aims to establish itself as a national high-tech centre for marine sciences and technology.



Planning period: 2010-2060

Proposed population: 0.7 million

Planning area: 97 km²

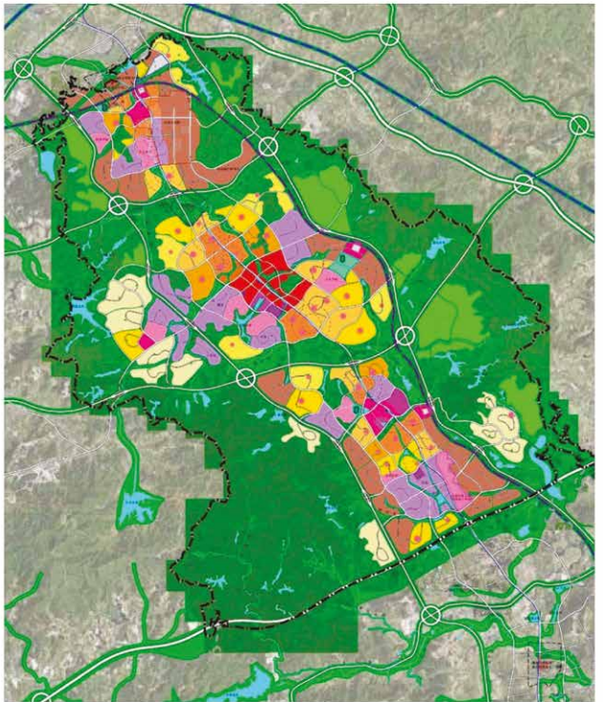
Urbanisation rate: 95%

Image 28: Region — Concept Plan of Qingdao Blue Silicon Valley
Source: RSP Architects Planners & Engineers Pte Ltd, Singapore

Planning structure: The Concept Plan covers approximately 220 sq km, which is basically virgin land with a small population of residents. With a planning period of 50 years, an urban development land area of 97 sq km and a projected population of approximately 700,000, this is considered a Region-level project. The Region is further divided into five Satellite Towns, and each would have its own town centre (Image 28), which is not only logical in spatial arrangement, but also well-integrated with the lovely natural environment. To enjoy the beautiful coastline, regional commercial centres are located at the waterfront land parcels. According to sources, the development authority is implementing the Concept Plan, and progress has been smooth.

New Town

• *Guangzhou Knowledge City, Guangdong Province* •



Planning period: 2010-2060

Proposed population: 0.5 million

Planning area: 60 km²

Image 29: New Town —
Concept Plan of Guangzhou Knowledge City
Source: RSP Architects Planners & Engineers Pte Ltd, Singapore

Local features: Located in Huangpu District, Guangzhou Knowledge City is a cooperative project between Singapore and China, after the Suzhou and Tianjin projects. It was positioned to be a new knowledge-economy-based and sustainable development-driven eco-city, whose mainstay is high-tech industrial R&D and production. The district has a natural advantage, given its well-endowed environment of lush hills and crystalline rivers.

Planning structure: The plan covers an area of 123 sq km, with an urban development land area of 60 sq km and a projected population of 500,000. It is a Region-level project consisting of three New Towns (Image 29), one Regional Centre and two New Town Centres, within which green corridors and water bodies are systematically integrated as an ecological network. What needs to be highlighted is that the Regional Centre will be the main commercial centre of its neighbouring area such as Conghua and Zengcheng, and functions as a CBD of the north-east region of the

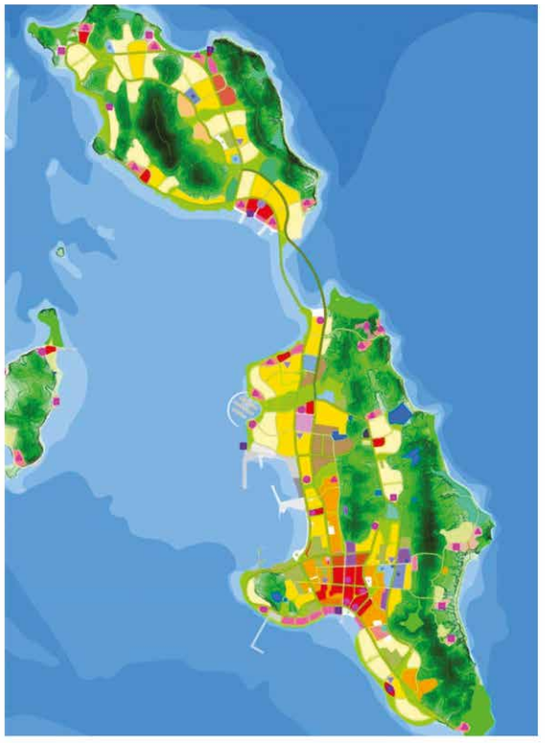


Image 30: Islands - Changdao Concept Plan
Source: RSP Architects Planners & Engineers Pte Ltd, Singapore

Constellation City of Guangzhou. The start-up area is 6.27 sq km, and includes a commercial and administration centre, a conference centre, high-tech industrial parks and residential areas. Developments within the area will adopt high standards in construction, urban management, business and investment operations. With the aim of creating a transit-oriented development where transportation is integrated with life, work and leisure, the closer the land to the rail transit stations, the higher the development intensity.

Tourism Islands

• *Changdao, Shandong Province* •

Local features: Administered by Yantai City, Changdao County is the second largest island county in northern China. It is located between the Jiaodong Peninsula and Liaodong Peninsula, to the north of Penglai Pavilion (蓬莱阁), comprising 32 small islands, where the Eight Immortals in Chinese mythology crossed the sea. Crossing over to Lushun from Penglai Pavilion, which seems scientifically reasonable, must be a wonderful experience! From Penglai Pavilion, those with good vision will be able to see five nearer and larger islands which are the main areas of our planning project.

Planning structure: The plan covers an area of 32 sq km, where currently resides a small and dispersed population. The planning period is 50 years (2010 to 2060), and with a projected urban population of about 80,000, it has been positioned as a New Town aimed to be developed into a nationally renowned and internationally popular destination for eco-tourism (Image 30). Of the five islands, planning and development will focus on the two larger islands closer to Penglai city in order to save infrastructural investment and conserve the original ecosystem of other islands. The plan also proposed preliminary shipping lanes from the two larger islands to the other smaller ones.

Another special feature of the plan is that all buildings are limited to seven storeys, with only a few select blocks allowed up to nine storeys. The architecture design of the buildings should be both modern and Chinese, just like Greek islands which are strongly Greek, and Italian islands strongly Italian. I wish that Changdao will develop into a world-class tourism island that breathes a classic Chinese flavour.

Central Business Districts

• *Jinan's Central Business District, Shandong Province* •

Local features: Jinan, the capital city of Shandong Province, is the renowned "City of Springs", with a long history and rich culture. As a regional financial centre, it lies to the southern part of the Bohai Rim region, at the lower-middle reaches of Yangtze River. However, the current development in the city does not present a strong urban character.

Planning structure: Jinan's current central city has a population of approximately 4 million, and the projected population of the existing plan is 5.5 million by 2020. Our project focused on the detailed plan and urban design for the CBD, which covers an area of 3.3 sq km with a proposed

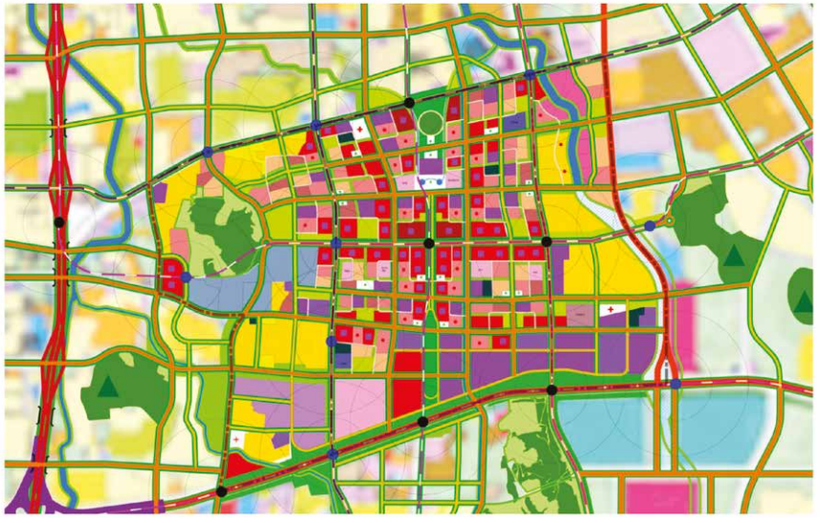


Image 31: Central Business District — Jinan CBD Urban Design

Source: RSP Architects Planners & Engineers Pte Ltd, Singapore

development quantum of approximately 9 million sq m (Image 31). It is planned based on the CBD prototype, emphasising two aspects: being functionally complete and environmentally sound. In addition, a multi-tiered public open space system has been developed within the CBD, to introduce parks and plazas of various scales for public activities, together with the north-south commercial axis and east-west landscape axis, the green network has become the CBD's special highlight. Thankfully, local leaders paid great attention to traditional cultures, thus we specially selected certain districts to stress Jinan's local cultural character expressed in the urban design, so as to direct the appreciation and promotion for local culture in architectural design. Within the pan CBD area, functions like exhibition, creative and entertainment activities area also provided to supplement the CBD.

Summary

Reflecting upon the plans that I have created for Chinese cities, they all eventually met with their respective fates. After completion, many plans were either aborted due to a change in leadership, or changed fundamentally before or during implementation. Nevertheless, some cities did persist for more than 20 years and have achieved satisfactory results.

A good example is Xiamen Island, a famous liveable city in China. Singaporeans travelling there will feel a sense of déjà vu. Previous Xiamen mayors and party secretaries did respect our plan, and did not alter as they pleased. Back then, when we discussed the traditional covered walkway "骑楼" on the island, the government had wanted to demolish them. However, I persuaded them that these old buildings would be the gold mine of the future tourism industry of Xiamen Island, and it would definitely be unwise to demolish. Finally, they were convinced. Nowadays, anyone who goes to Xiamen will find that the most impressive and busiest places are these traditional buildings. Furthermore, everybody enjoys the view of Yundang Lake, without knowing that it used to be a dirty and severely polluted pool. At that time, the Xiamen government was not too interested in rehabilitating it into a landscaped lake. Being in my 50s then, I told the senior officials at the meeting bluntly, if not impudently, that the meeting would not go on if we did not resolve the problem of water pollution that day itself. Thanks to that particular meeting, Yundang Lake is what it is today.

Having a Fujian ancestry, I have been a passionate participant in the planning and development of Fujian Province. Those days, I also made efforts to save Fuzhou's "三坊七巷" (literally, three lanes, seven alleys), their prime historic district. So I am most gratified to hear that the area has become one of China's top 10 historical and cultural streets, and has been rated one of China's 5A tourist sites.

In Yangzhou, I saw two successive mayors who had been able to control the space and height within the city centre very well, and managed to completely conserve an old urban area, which is rarely seen in China. When I was planning for the new CBD, the city leadership wanted buildings in the CBD to be limited to 20 storeys so as to ensure consistency with Yangzhou's image as a medium-sized city. Obviously I was overjoyed. Yangzhou's liveability is clear to all.

Comparison of the Planning Practice between Singapore and China

I have done more projects in China than in other countries because China and Singapore have similar urban development advantages, some of which have been summarized as follows:

State-owned Land

Singapore's Government has been influential with regard to land management. To date, about 76% of our total land is State-owned. Under the control of the Government, this land can be developed as planned to serve the needs of the city. The remaining land, being privately-owned, can be freely bought and sold, and from which the true market value of land and property is derived.

In China, land is either State-owned or collectively-owned. Although acquiring land in China is a complicated process, the government's planning intentions can still be easily implemented as compared to other regions or countries. If a large percentage of land is being held in private hands, the government will be unable to find enough land to develop even if it wanted to. In this regard, China and Singapore are similar, as both countries have apparent advantage in land acquisition.

Strong Government, Rapid Growth

Singapore's Government is elected through secret ballot, which makes it a fundamentally democratic regime. Singapore can develop rapidly partly because it has a robust administrative system and a highly credible and well-trusted government, which ensures easy execution of plans and policies.

In China, within the government's top-down mechanism, there are designated officials responsible for urban planning and urban development at each legislative tier, meaning from state to province, city and county. This is rarely seen in other countries. Given such a sound administrative system, the government is able to devote more effort to fulfil its development responsibilities.

Emphasise Master Plan, Encourage Urban Development

To call Singapore an "urban laboratory" would be true to its name. Earlier, I elaborated on the emphasis the Singapore Government places on planning, as well as the formulation and execution of Intelligent Planning. Lately, the Chinese government has been advocating the concept of "New Approach towards Urbanisation" ("新型城镇化"), which focuses not only on the planning and development of big cities, but also on small and medium-sized cities. This is indeed good news. In fact, China is similar to Europe in that both have a long history, and every small and medium-sized city has a distinct culture that manifests itself in the local historical architecture, cuisine, wine-making process and so on. This is why I often tell my Chinese friends who travel to Europe to not only visit the big cities, but also the small and medium ones. In the past, I was worried that the Chinese government would not value the special local characteristics of small and insignificant localities, as this would cause the local attributes to be destroyed during the urbanisation process. With the policy of "New Approach to Urbanisation", however, I am very hopeful that small and medium-sized Chinese cities will face a different fate.

Because of these contributory conditions, I believe that, other than Singapore, the country or region most suitable for development and most well-placed to do well in urban planning is not Chinese Taiwan and Hong Kong, United States or Europe, but Chinese mainland! I say this not to flatter. It is the truth. China therefore has no reason to not do well in renewing and developing its cities. So, what exactly does China lack? She lacks an Intelligent Planning concept.

Applicability of Singapore's Planning Experience in China

The scale of urban planning is universal. Some Chinese doubt if a small country such as Singapore could help solve urban problems in a country as big as China. Such doubts are reasonable. However, I believe that the subject of urban planning is not the country, but the city. If the planning theory developed in Singapore is a rational one, then its principles and techniques could be applicable globally. No matter how big a city is, based on the Family of Cities concept, it can always be sub-divided into urban units of various sizes. This theory is universal as it relates to a human being in terms of the "sense of scale".

This so called "sense of scale" refers to the scale requirements for the best level of comfort for various functions within a person's activity space. For example, a bedroom that is 10 to 20 sq m would provide for a good night's sleep, whereas an indoor stadium would not. Likewise, settling hundreds of residents on a land parcel of 3 to 5 hectares might gradually give one a sense of belonging to the land; but a much larger parcel with tens of thousands of people might make one feel so small that he or she does not feel like an important member on that land, and therefore hardly develops a sense of belonging.

Certainly, Singapore has picked up many theories from the West, but these theories must be tested and recalibrated in Singapore's urban laboratory to find the most appropriate and effective formula to meet the needs of the city. From here, an Asianised planning theory can be derived. Singapore has been testing the theory on itself over the past few decades and the research outcome has become valuable practical experience to be shared with other cities. Determination and willpower ensure success. With China having thousands of cities, I hope to be able to select several as models for urban operations, such that they can observe a sound urban development pace, from planning to implementation and from beginning to end. This will demonstrate to, and convince, other Chinese cities that good planning principles, together with a logical planning execution approach, would surely enable us to "export" Singapore's planning model into China, and deliver the impact of world-class liveable cities. Also, I believe that the successful experience of Chinese cities' urban development will in turn benefit other densely populated countries or regions such as India, Southeast Asia, Africa and South America.

Those important urban development regions emphasised in China's "Major Function Oriented Zoning" (主体功能区规划), such as the Jing-Jin-Ji Region, the Yangtze River Delta Region, the Pearl River Delta Region, as well as north-eastern city clusters and inland city clusters, are ideal urban areas suitable for the application of the Intelligent Planning concept, the Family of Cities (e.g. Constellation City and Urban Milky Way). The concept will help analyse and quantify the needs for ecology, transportation, function and industry and so on among city clusters and also among different cities within each cluster, so as to guide the development of regions and cities in an orderly, rational and well-coordinated manner.

With regard to the Pearl River Delta Region, I have recently prepared plans at various levels of detail for several cities within, including Guangzhou,

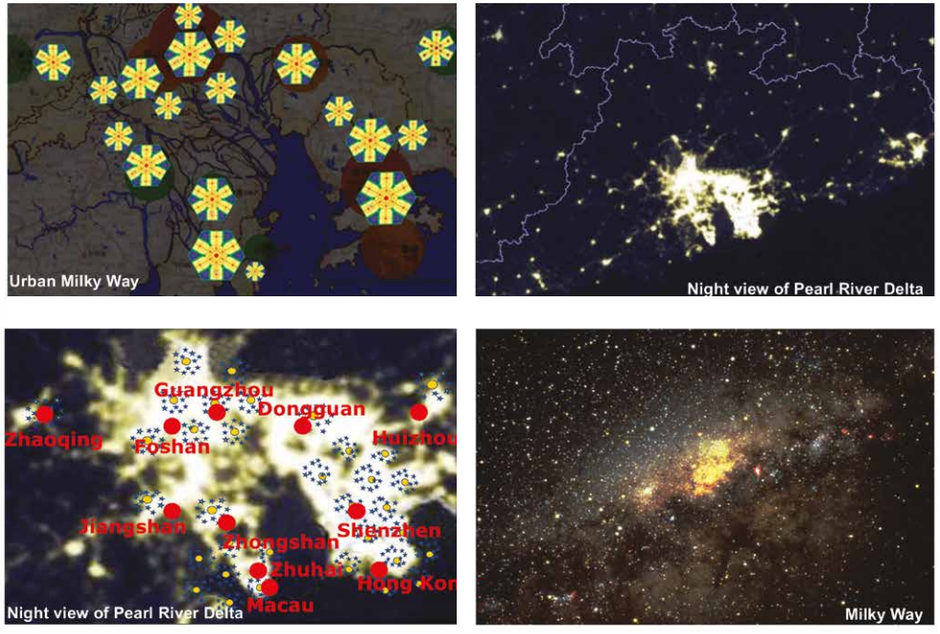


Image 32: Urban Milky Way — Pearl River Delta Region
Source: RSP Architects Planners & Engineers Pte Ltd, Singapore
http://images.nationalgeographic.com

Zhuhai and Heshan; and have developed a better understanding of the Region. I would suggest using the Family of Cities concept to analyse the relationship of urban functions and economic positions among cities in the region. In general, cities around the Pearl River Mouth, by virtue of the geographic locality, transportation connectivity and industrial cooperation, have developed into three typical Constellation Cities, in which Guangzhou-Foshan, Shenzhen and Zhuhai are the core cities. Together with many other surrounding cities and regions, each complements and balances one another in the overarching regional development. By this, it has become an Urban Milky Way. Referring to the Milky Way in the heavens above, there are many stars, and each of them exists independently while interacting with others, to form different constellations and galaxies, which have distinct bearings of their own while also closely linked to one another.

The upper left image in Image 32 illustrates an indicative analysis of the Pearl River Delta Region based on the Family of Cities concept. On the lower left is the satellite image of the region at night. The upper right image shows a zoom-out of the same image, which is very similar to the image

of the Milky Way shown in the image on the lower right. This urban belt of megacities, formed by constellation cities, cities and regions, is precisely one of the most important areas for China's economic development. Applying the planning concepts described above will be very useful for a well prepared long-term strategic spatial plan.

In the future, it is estimated that the construction volume of India alone may equate to that of five United States; China, three United States; even Indonesia, one or two United States. So, to develop these three countries would mean building up nine United States. In other words, for every house, sewage treatment plant, power station or road constructed in the United States, China, India and Indonesia combined would need nine! The development volume is incredible. If Singaporeans could master well the solid skills of urban development, and boldly give play to their true strength, this vast market is infinite. We can cooperate with these countries together to strive for the excellence of urban development; it will definitely benefit the people of these countries.

On the other hand, if we do not handle this task well, the result might be harmful to the global environment. It is precisely because the volume is huge that the mission and responsibility are especially ginormous.

Wishes for China's Urban Development

At the moment, China is right in the midst of rapid urbanisation, facing aggravating and serious environmental and social challenges, resulting in many urban issues such as air pollution, traffic congestion, strained infrastructure, inadequate heritage conservation as well as Rural-Urban imbalance and so on. Although many cities have constructed dazzling buildings, authentic local character is quietly disappearing. Even ordinary people who are not professionally trained are sensing the serious problem of homogeneity across cities. Meanwhile, many villages of simple beauty are falling into decay. Hence, this phenomenon not only places strong demand on the city administrator and urban planner, but also highlights the necessity of reforming the planning practice, through rethinking theories, concepts, techniques and regulations, as well as urban administrative measures and mechanisms.

I wish that China would maintain its current strong development momentum, at the same time, improve the planning culture, identify the government's responsibilities, manage macro strategies well, and make full use of its given planning and administrative advantages to build better cities.

Improve the Planning Culture

To the Chinese, "画蛇添足" (literally, adding feet to a painted snake), which means gilding the lily, is taboo. It is also a common professional mistake that planners must avoid. Everything should be done in moderation, and anything superfluous is self-defeating. For example, a landscape designer who adds heaps of expensive artificial rocks and pavilions to a gorgeous landscape overshadows its original beauty, ruins the natural environment, and would have spent money unnecessarily.

In China, there is a problem that I often encounter. Having submitted the plans that have been communicated and discussed repeatedly with the clients, the local planners seem inclined to change them back to what they usually do in their current practice. The main reason must be that they do not understand the rigour and precision involved in planning. This results in a common and serious problem, "差之毫厘，谬以千里" ("A small deviation, A thousand miles of errors") (Image 33).

Image 33: "天下太平" ("Peace on earth")

For projects that I have undertaken in China, I have found that original plans usually fail to fully account for urban functions. If I may use Chinese characters to illustrate a poorly assembled plan, they are like four randomly placed characters, such as 二 (*er*), 卜 (*bo*), 人 (*ren*), 干 (*gan*), which do not convey any logic or meaning. By studying and thinking through, I would "Intelligently" add a few strategic strokes, enriching the content and giving structure and meaning to the plan. Metaphorically, these strategic strokes complete the illegible characters above, forming天 (*tian*), 下 (*xia*), 太 (*tai*), 平 (ping), which means "Peace on Earth"! However, when the local planners feel compelled to refine my plan by adding just a couple of strokes or by changing their positions, thinking that small changes do not really matter, alas, 天, 下, 太, 平 becomes 夫 (*fu*), 卞 (*bian*), 犬 (*quan*), 半 (*ban*), making it just as meaningless as the original and simply unfortunate that a holistic plan falls apart again. This is one major challenge I often face in China.

Identify the Government's Responsibilities

China's governmental system is understandably more complex than Singapore's. Thus, its leaders must try harder to work with its district, county and township governments to look at the big picture and cooperate with one another. Planning teams need to be more professional, and local people need to treat plans and developments rationally. There must be a clear division of responsibilities between the government and the private sector. Meanwhile, the government agencies should foster a healthy attitude towards dealing with problems. Inappropriate attitude to dealing with problems is something common to both Singapore and China. Some people may be overwhelmed when facing problems and challenges, and tend to focus only on problems while overlooking the opportunities that problems bring. Having a problem could sometimes provide an excuse for not doing well. In reality, one cannot simply give up when a problem arises; instead, more effort should be devoted to solving it. If we quit when too many problems emerge, how would the city improve?

When I shared my plans with Chinese officials, many would say that the plans were based on Singapore's circumstances, and since China has a different national standing, it is unable to follow the plan. "Different national standing" need not, and must not, be used as an excuse. As long as the principles are rational, they can be applied across borders for everyone to embrace with an open mind. When real problems arise, we must solve them. Today, Singapore's better national standing is achieved by overcoming the backward mind set. When I was working in the Government, my colleagues and I did go to great lengths to solve many difficult problems. I also found that the more difficult a problem, the earlier we should deal with it, because delaying it to the next day would only breed a more intractable problem.

Delete the Word "赶 (Rush)" from the Kangxi Dictionary

The impression given by China's urbanisation endeavours are: tight schedules, huge responsibilities, and big rush for everything. I often tell my Chinese friends jokingly that if the word "赶" ("*gan*", hurry or rush) could be deleted from the Kangxi Dictionary, Chinese cities could do better in their development. Strictly speaking, in the past, Singapore was also faced with an urgent need to develop. However, while we definitely pursued speed, we were careful not to rush. In other words, while projects were being carried out, plan preparation was also on-going. First of all, the plan must be intelligent and rational; after it is done, it must be strictly complied with for all future projects.

Similarly, for Chinese cities, urgent work can still be carried out while the plan is being finalised. Anyway, these cities have existed for centuries, and an additional year or two of further development based on the current imperfect plan will not affect their urban environment substantially. But, once the plan is completed and adopted, subsequent projects must be developed as planned.

Manage Macro Strategies Well

I wish the Chinese government could manage the macro strategies well, and devise an "Intelligent Urban Planning" approach. Avoid having several different departments making their own plans which will result in inconsistencies in execution and administration. It is necessary to devote great effort to push for "Four Plans into One" ("四规合一") or "Multiple Plans into One" ("多规合一") to give plans greater credibility and authority.

I also wish that China would take full advantage of the new policy, known as "New Approach towards Urbanisation" ("新型城镇化"), by diligently thinking through and rationally prescribing the appropriate population densities of its cities based on their projected population sizes. With this as a starting point, it would be very desirable for city leaders to make Intelligent plans, rationalise rules and regulations, implement all projects strictly according

to the plans, and enact appropriate taxation policies. This way, through a multi-pronged approach, urban plans can yield the anticipated results.

Chinese Cities with Development Potential

I wish that Chinese cities can extensively cultivate the concept of Intelligent Planning and do well in all aspects of its planning endeavour. Many Chinese cities can become truly world-class if they are developed well. I am particularly concerned about the potential development of several famous Chinese cities, and would like to share some thoughts here that could make them not just good, but grand, cities.

• The Beijing Axis •

The central axis of Beijing, from the Yuan, Ming and Qing dynasties to the beginning years of the People's Republic of China, has been lined up with world-class planning and architectural works. I wish that the Chinese people of the 21st century would continue to work along the axis to the south of Qianmen (literally, "Front Gate"), Zhengyangmen , to create excellent plans and architectural masterpieces that match up to the impressive achievements of Chinese forefathers.

• Xi-Xian (Xi'an- Xianyang) New Area •

This is a key national level project and I am honoured to have been invited to take part in its planning. Other than managing the general and functional aspects of planning, I also hope to make Xi-Xian New Area a city that blends modernity with its rich historical and cultural fabric.

The ancient city of Xi'an already has several axes. A modern day axis can also be created if we connect the newly planned CBD in Xi-Xian New Area southwards with a Zhou Dynasty historical site. Both sites are about a dozen kilometres apart from each other. The exciting part is that this could be a new axis connecting ancient and current times. Along this axis, from a functional perspective, several commercial centres have been arranged, which brings Xi-Xian a rare opportunity to build chronologically from south to north, small classical buildings that represent the architectural styles of the past 13 dynasties in Chinese history. This is an opportunity that Singapore will never have, and I wish it could be realised smoothly.

• Kaifeng •

Whenever people speak of cities in the Tang Dynasty, Xi'an immediately emerges. However, when it comes to the Song Dynasty, it becomes difficult to readily identify a city. That being said, the original site of the painting, *Riverside Scene at Qingming Festival* (清明上河图), is actually located in Kaifeng, where the existing Red Bridge surprisingly looks almost identical to the one in the painting — amazing! If old buildings of the Song Dynasty in the painting could be reproduced based on their original scale, Kaifeng would certainly become a tourist destination that has profound historical, cultural and architectural significance. This would not only make a significant contribution to China, but also to the world.

It has been said that even during the Song Dynasty, Kaifeng's population was already one million and that it was one of the biggest cities in the world. If the ancient city could be restored and its historical buildings protected, while requiring new buildings to be both modern and rich in Song architectural style so as to carry forward the Song culture, it would be yet another happy achievement for the world. The Chinese people need to make a genuine effort to plan their cities Intelligently. With a willing heart, nothing is impossible.

• Qufu •

Qufu is Confucius' hometown and should be developed into a world-famous city of the philosophic sage. Of course, its current most important landmark is the monument built in honour of Confucius, or Kong Lin. When developing the plan for Qufu's central city, it was found that Qufu also has a historical axis, and on it, from east to west, are historical footprints of ancient times and the pre-Qin period. The axis then turns southwards, where the Han and Tang dynasties were located, followed by the Song, Ming and Qing dynasties and the era of the Republic of China. In the new plan, I attempted to extend this axis further southwards so as to maintain the historical continuity of the city into the 21st century. New buildings along this axis should be both modern and traditional in terms of urban and architectural design. Especially at the southern end of the axis, a Confucius and Confucianism Museum with Chinese cultural flavour and of world-class standard has been recommended. I anxiously await the successful fulfilment of this vision.

With a population approaching 20% of the total global population, China, as an ancient civilisation, is rich in culture and natural resources. She is also fast urbanising with an increasingly strong economy and is therefore capable of seizing such a great historical opportunity to plan and develop her cities well. Given the right approach, I am convinced that Chinese cities could and should account for at least 20% of famous cities in the world. This is not a question of time but a matter of determination and will power.

Author's note: I would like to thank my colleague, Ms Chen Hong, who helped edit my writing and enrich the contents on the comparison of planning in Singapore and China.

Complexity and Urban Governance

Peter HO and Joyce NG

The challenges of urbanisation

Our world is urbanising at an unprecedented pace. Many migrants to cities seek to escape from the poverty of rural life, and are attracted to the promise of better jobs, access to education and healthcare. Today, with more than half the world's population living in cities[1], cities are now the predominant typology for human habitation. By 2030, the United Nations[2] estimates that the number of people living in cities will swell to 5 billion, up from 3.9 billion today.

Urbanisation on the scale — and at the pace being experienced today — will place enormous strain on the functioning of cities. Cities will have to cope with increasing pressures on infrastructure, whether physical, social or economic.

Cities will experience many challenges. These include the need to provide sufficient quality and affordable housing to accommodate a growing population, employment opportunities, and adequate infrastructure for water, sanitation, energy, transportation, information and communications. At the same time, cities will have to prevent environmental degradation and preserve natural assets within the urban setting and the surrounding areas. Cities will also have to find ways to vitalise their economies in a highly competitive environment. Key to addressing all these challenges is good urban governance, framed within a lens of complexity.

Complexity and cities

Cities are complex systems. The urban studies activist Jane Jacobs wrote that "city processes in real life are too complex to be routine, too particularised for application as abstractions. They are always made up of interactions among unique combinations of particulars, and there is no substitute for knowing the particulars."

Complexity science tells us that within a city, there are countless **agents** — people, institutions, markets and networks — interacting with each other in unpredictable and unnoticeable ways. The city then interacts with other cities, nationally, regionally, and globally, again with all the characteristics of an even larger complex system. Such complex systems are characterised by "emergent" outcomes, with causes and influencing factors that are not always predictable *ex ante*, or ahead of time. Such emergent outcomes can be black swans, described by the risk analyst Nassim Nicholas Taleb as hard-to-predict events with a large impact. How cities respond to these unpredictable outcomes and challenges of complexity will determine their success or failure.

Literacy, political structures, levels of industrialisation, and per capita income are conventional indicators of economic health. However, the economists Ricardo Hausmann and César Hidalgo have suggested that the most important predictor of growth is economic complexity, or the diversity of products that an economy possesses.

Economies with the most natural resources tend to be relatively simple, in complexity science terms. They do not produce unique goods. Thus, economies that are dependent on a particular kind of export — for example, oil or timber — may do well when demand for these products are high, but fail in the long run because they are not sufficiently diversified and cannot compete in other sectors.

A case in point is Detroit, a city that built its fortunes on the automotive industry. Detroit became highly reliant on the automotive industry. But after the Second World War, auto manufacturers began to move to suburban areas, outside the city's confines. This in turn led to residential movement to the suburbs. From a peak of 1.85 million in 1950, Detroit's population today is less than 700,000, a decline of more than 60%. Population flight led to loss of tax base and jobs. Detroit declared bankruptcy in 2013, and its unemployment that year was 23.1%.

The ability to produce unique goods and services depends on the amount of "productive knowledge" in an economy. This is the kind of knowledge derived from experience and exposure to different sectors and domains of production. Invention and innovation occurs when these bits of productive

[1] United Nations, Department of Economic and Social Affairs, Population Division. *World Urbanization Prospects: The 2014 Revision, Highlights*. (ST/ESA/SER.A/352). 2014.
[2] United Nations Population Fund. *Urbanization*. http://www.unfpa.org/urbanization. [Accessed in 2015]

knowledge are connected. Improvements to economic growth can be achieved either by harnessing existing capabilities in new combinations, or by accruing new capabilities to expand the productive potential of the city. These improvements also enhance the city's adaptive capacity to respond better to shocks and stress, re-invent, to remain resilient and relevant in the long term.

The Harvard economist Edward Glaeser tells of how Boston, in the 17th and 18th centuries, was the leading port in America. It thrived as a conduit of goods between the old world and the new. But by the mid-18th century, Boston as a port had been eclipsed, first by Philadelphia, then by New York. What saved Boston from the fate of other New England ports was a large population of Irish immigrants. By the late 19th century, Boston had transformed itself into a centre of manufacturing built on immigrant labour, and it prospered on the back of America's industrialisation.

But Boston's heady period of growth was over by 1920. Population growth slowed and even began to shrink after 1950. However, in the last two decades of the 20th century, Boston again re-invented itself, this time from an industrial city in decline into a high-tech, service-based economy. Its population grew rapidly between 1980 and 2000, reversing 50 years of stagnation and shrinkage.

Boston is now a centre of the information economy in the United States. Today, education is the dominant factor in Boston's economy. Boston ranks highly in its share of employees in managerial and professional jobs. Its top four export industries today are all skills-based: technology, finance, education and healthcare.

Using the lens of economic complexity, the Boston case shows us that the ability to re-orientate and create new value hinges on economic complexity. From its earliest days, Boston was never just a port. Artisans manufactured some of the goods traded on Bostonian ships. Boston had banks, brokers and insurers from its seafaring days because shipping needed financial services. Education was always valued in the colony — Harvard University was founded in 1636 with government money.

Its rich, complex strengths and competencies enabled Boston to reach within itself to find new connections and value propositions. These enabled Boston to re-invent itself time and again when other more brittle, less economically complex cities like Detroit, heavily dependent on manufacturing, went into terminal decline.

From the illustrations above, reducing complexity is not necessarily a strategic policy objective. Arguably, policies should catalyse economic complexity, by creating more networks to connect multiple economic domains. These constant and close connections to a wide network of capabilities create rapid access to solutions and facilitate integrative responses to stay ahead of the competition.

Cities as hubs

Throughout history, hubs have been the main engines of global economic growth and development. Network theory provides us with insights to explain why hubs acquire wealth more easily than other nodes in a network. The most important and successful cities are not necessarily the largest cities, and having a thriving local economy or being a regional player is not sufficient. Instead, successful cities are those that have successfully integrated themselves into the global network of world cities, connecting their local industries to globalised activities and flows of capital, knowledge, resources and talents. Cities that are not plugged into the global network risk losing their best people, their companies, and their economic competitiveness.

Today, as in the past, the world's economic geography remains dominated by hubs that are the focal points of opportunity, growth and innovation. Firms locate where skills, capabilities and markets cluster. Therefore, it is crucial for cities to be able to form collaborative linkages with other global hubs in an increasingly globalised world, because high-skilled workers do not just work anywhere — they cluster in successful cities because of the expansive, borderless "knowledge networks" in place.

Singapore is a major hub in today's globalised world. As a top air hub, it enjoys excellent connectivity to the Asia-Pacific region, and is one of the most important centres of global air travel today. Singapore's container port operates the world's busiest transhipment hub, and is the second busiest container port after Shanghai. The city-state is also one of the most digitally connected cities with the highest penetration of mobile broadband subscription per capita in the world. Singapore was also recently ranked first in the World Economic Forum Global Information Technology Reports and Networked Readiness Index 2015.[3]

[3] Info-communications Development Authority of Singapore. *Singapore's ranking in Infocomm*. https://www.ida.gov.sg/Tech-Scene-News/Facts-and-Figures/Singapores-Ranking-in-Infocomm [Acessed in 2015].

Singapore's Container Terminal. Located as the world's transit hub, Singapore's container port is the second busiest port after Shanghai's in the world.
Source: Maritime and Port Authority of Singapore (MPA)

But, of course, it would be a mistake to assume that the density of connections and dominance of existing networks are permanent. New technologies can create new networks with new hubs and new connectors, easily disrupting existing patterns of power. Changes in trade patterns and economic conditions can also impact on the hub status of cities. Venice is an object lesson. At its peak in the 13th century, Venice was the second largest city in Europe after Paris, and its most prosperous. It was the leading hub in Europe, linking up the main trade routes between Europe and Asia. But the fall of Constantinople to the Ottomans in 1453 disrupted the traditional land trade route from Europe to Asia, forcing Europe to find alternative trade routes to the East. At the turn of the 16th century, Portugal's discovery of a sea route to the East Indies further undermined Venice's monopoly. New ports emerged to become Europe's main intermediaries in the trade with the East, striking at the very foundation of Venice's wealth. The discovery of new routes to Asia shifted the economic centre of Europe towards the Atlantic, making the Mediterranean Sea a backwater and Venice a peripheral power. Instead, cities like Amsterdam and London assumed new dominance. With its centrality as a commercial hub broken, Venice declined and eventually fell to the Austrians in 1797.

Whether cities continue to be hubs in such emergent networks will depend on their speed, adaptability and boldness to seize first-mover advantages.

Cities generate "wicked problems"

As complex systems, cities produce what are called "wicked problems". The political scientist Horst Rittel described wicked problems as highly complex issues: large, intractable, with no immediate or obvious solutions. These issues hardly ever sit conveniently within the responsibility of any single agency or authority. Worse, wicked problems have many stakeholders who not only have different perspectives, but who also do not necessarily share the same goals. It is not difficult to find wicked problems in an urban setting: ageing, environment, transportation, urban planning, and so on.

In Mumbai, India, providing a burgeoning population with a good quality of life involves addressing many wicked problems that are inextricably linked to each other in complex ways. The majority of the urban poor have no choice but to erect makeshift shelters because of the scarcity of affordable housing and the predominance of a low-wage market. In the densely packed urban landscape of Mumbai, they live on public land as squatters, along public thoroughfares, buttressing public water pipelines and under public electricity grids. Their status however does not attract enough support from the state. Public infrastructure such as water pipes, sewers and electricity grids bypass the poor of Mumbai's squatter colonies. These squatters are compelled to procure such basic services from an exploitative informal market.

As cities develop and societies become more diverse, how do cities alleviate and resolve such wicked problems to build more equitable and inclusive cities with good quality living environments that are accessible to all? How can cities more adeptly manage the inevitable pressures on their urban environments? How can cities stay resilient against the global impact of climate change, security threats, epidemics and unanticipated events?

Good urban governance

In Singapore, the Government recognises that being connected to the global network and properly managing the complexity of the economy are important elements in building a resilient and competitive city. But these are not sufficient conditions to sustain Singapore's success into the long term. Instead, a foundation of good governance, that provides the direction and political will, is central to integrating all these elements, and translating the vision and success factors of a liveable city into reality for its people. Boundaries are very often used to reduce complexity. This is achieved by drawing boundaries around smaller parts of a larger system in order to make things easier to manage. Nations are divided into provinces, provinces into cities, cities into municipalities, and so on. Companies are organised into departments, and governments into ministries.

This approach is useful and necessary – up to a point. But it is often not adequate for addressing wicked problems. The reality is that no single government agency is really equipped to deal with wicked problems in its entirety. Letting ministries and government agencies tackle different wicked problems on their own often leads to contradictions or duplication, waste and sub-optimal policies, and even to new wicked problems.

The "Whole-of-Government" approach

Breaking down organisational silos is key to tackling the wicked problems of complexity. Because wicked problems are inherently complex in their scale of uncertainty and disagreement, they are best tackled by diverse teams, drawing on different knowledge systems and experiences, and sharing information drawn from large parts, if not the whole, of the government system. In Singapore, this effort is called the "Whole-of-Government" approach.

The Whole-of-Government approach is the foundation of urban governance in Singapore. It acknowledges the complexity of the urban environment and the uncertainty of the future. Developing policies and plans to deal with such wicked problems requires breaking down organisational silos in order to understand the entire urban system and its many inter-related dimensions. It means changing the bureaucratic mindset that is predisposed to operating and thinking within vertical silos, to cultivating a mindset in which officers consider the spillover effects of what they do and their impact on the policies and plans of other agencies. It is a mindset that embraces a willingness among agencies to work together to make organisational trade-offs in order to achieve common outcomes for the greater good.

Because the Singapore Government sees governing in complexity and managing wicked problems as fundamental to good governance, it takes the Whole-of-Government approach very seriously. In 2015, for the first time in Singapore's political history, the latest Cabinet includes three Coordinating Ministers, each responsible for a larger cluster of wicked problems centred on national security, economic and social policies,

and infrastructure. This move is a strong political signal of the Singapore Government's determination to exploit the Whole-of-Government approach by giving more top-level direction to all ministries to pull together towards common national goals.

Urban planning as a wicked problem

While other countries have large land areas, which allow new cities to develop and replace other cities that may decline in relevance and fortune, Singapore as a small island nation does not have that luxury. Instead, urban planning in Singapore needs to take into account the huge challenges of packing in housing, green space, industrial land, commercial and retail space, land for transportation needs, and military training areas, all within the confines of a small island of 717 square kilometres.

The Whole-of-Government approach to urban planning enables Singapore to consider long-term scenarios, devise implementation strategies and plans, and coordinate developments on the ground — all in an integrated way. In Singapore, the entire urban planning process, from the review of the strategic Concept Plan to the implementation of a detailed land use master plan, involves close collaboration among economic, social and development ministries and agencies, as well as consultations with various stakeholders in the private sector and the general public.

This Whole-of-Government approach enables all stakeholders to better understand interdependencies and implications of land use and strategic decisions. In complex environments, insight and good ideas are not the monopoly of single agencies or of the Government acting alone. People from different organisations, both from within and outside government, come together and pool their knowledge in order to discover potential solutions.

Taking a more adaptive, emergent approach, the Singapore Government has begun working with the people and private sectors to jointly understand issues to create solutions and policies. Engaging citizens and businesses provides fresh insights and ideas to deal with wicked problems and other challenges arising from complexity. There is great value in building strong partnerships with non-government stakeholders in order to tackle complex and wicked problems, to create a liveable city and to achieve people-centric outcomes.

Prime Minister Lee Hsien Loong visits the exhibition of Singapore's Master Plan.
Source: Urban Redevelopment Authority (URA). All rights reserved.

For instance, the Urban Redevelopment Authority (URA)'s Master Plan 2014 Review entailed gathering feedback from the public to finetune plans for Singapore's urban development. Over an eight-week period, the Draft Master Plan exhibition welcomed some 71,000 visitors, and it was organised with online portals to obtain public feedback and solutions.

Public participation and discussion for the "Rail Corridor" Project

Source: Urban Redevelopment Authority (URA). All rights reserved.

Another example is the 24km long Rail Corridor, the ground where the former railway line used to be, that runs through Singapore from north to south. Together with the Rail Corridor Partnership [4], the URA spent two years involving the public, the communities along the corridor, students, interest groups and industry in developing the ideas for the re-use of this land. This approach, which could even be described as a Whole-of-Nation approach, crystallised the vision for a well-loved, unique, nature and community linear space that will connect 1 million residents. By tapping into ground knowledge, and encouraging citizen participation, the Singapore Government hopes that there will be a sense of shared ownership of the Rail Corridor, which in turn will strengthen social resilience in the city.

Uncertainty and scenario planning in Singapore

The complexity of the operating environment of cities creates uncertainty. As complex interactions lead to emergent behaviour rather than foreseeable outcomes, accurate prediction is not possible. Rather, the approach should be to reduce uncertainty by understanding the range of possible futures that could emerge.

Hence, futures thinking is a systemic way to think about the future. A key process in futures thinking is scenario planning, which helps planners, policy-makers and decision-makers to be aware of uncertainties, challenges and opportunities that could emerge in different scenarios. In Singapore, national scenarios are developed at the Whole-of-Government level every few years. These national scenarios guide ministries and agencies to consider strategies and formulate policies in a variety of possibilities, and anticipate and plan for challenges and opportunities that could arise in the future.

[4] Urban Redevelopment Authority. *URA establishes Rail Corridor Partnership to explore and promote community activities along Rail Corridor*. 2 May 2012. https://www.ura.gov.sg/uol/media-room/news/2012/may/pr12-46.aspx [Accessed in 2015].

Singapore's Concept Plan and Master Plan

Singapore's development is guided by the Concept Plan — the strategic, long-range plan for the development of land and infrastructure for the country over the next 40 to 50 years. The Concept Plan uses long-term population and economic growth scenarios to provide a basis for devising strategies and plans in a coordinated and integrated way.

The strategies outlined in the Concept Plan are translated into the Master Plan, reviewed every five years. The entire process involves close collaboration among economic, social and development ministries and agencies, as well as consultations with various stakeholders in the private sector and the general public. This Whole-of-Government approach enables all stakeholders to better understand interdependencies and implications of strategic land use decisions.

The Singapore Government decided 20 years ago to phase out the first container terminal in Tanjong Pagar in the Central Business District (CBD) to provide room for the city to grow and be rejuvenated. A subsequent decision was made to consolidate all port activities to the western end of Tuas, to create a more efficient port hub. This will also allow prime land in the city to be released for future growth, and open up 16km of attractive waterfront for public access. Disciplined long-term planning guides the Singapore Government in making timely investments in critical infrastructure to build capacity and support a more sustainable outcome in the long term.

Marina Barrage. Marina Barrage serves not only as a source of water supply, control for flood, but also a recreational location for the people.

Source: Singapore's National Water Agency — Public Utilities Board (PUB)

Concrete projects based on the discipline of long-term planning include the reclamation of Marina Bay in the 1970s and the Marina Barrage, conceived from 1987[5]. Today, Marina Bay is a vibrant 360ha district with offices, hotels, shops and recreational facilities, enjoyed by both Singaporeans and tourists. The Marina Barrage, located in the middle of the CBD, is a huge freshwater reservoir created by damming the mouth of the Singapore River.

Policy-makers and urban planners then had the foresight that issues such as climate change and increasing demand for water would emerge in the future. Today, the Barrage serves multiple functions — it alleviates flooding in low-lying city areas by keeping seawater out, boosts Singapore's water supply by storing rainwater during the monsoon seasons, and is also used for recreational water activities. The Singapore Government recognises the need to go beyond "tried and tested" methods and is continually experimenting with new approaches and solutions.

Innovative culture: *The necessity of experimentation*

In complex operating environments, exploration and experimentation are often more valuable than predictions of analytical models. Major experiments undertaken in Singapore include the Singapore Armed Forces (SAF) Underground Ammunition Facility. Operational in 2008, it was the world's most modern underground ammunition facility and the first large-scale underground containerised facility designed, developed within a densely urbanised area[6] and built into a solid granite core.

An engineering achievement, it took more than 10 years to complete. Moving the storage of ammunition underground freed up large tracts of surface land for other uses that had been previously sterilised for safety reasons.

Another land-saving underground solution is the Deep Tunnel Sewerage System (DTSS)[7]. The deep tunnel sewers were conceived as an efficient and cost-effective solution to meet Singapore's long-term needs for used water collection, treatment, reclamation and disposal. Completed in 2008, this system flows some 50m below ground and, in the process, frees up about 135ha of land for other uses and removes the odour nuisance created by conventional sewage treatment systems.

The Jurong Underground Rock Cavern, dug out of sedimentary rock under the seabed, is the first commercial underground rock cavern facility used for the storage of liquid hydrocarbons in Southeast Asia. Located 150m below ground, the cavern not only ensures the security of the products in storage, it also saved approximately 60ha of land[8] that might have been needed if the facility had been built above ground. Equally important, it created a new and important economic activity in the form of underground storage of liquid hydrocarbons.

These successful experiments helped build government capabilities in the use and development of underground space. They convinced the Government that the large-scale exploitation of underground space was a viable proposition, and led to the current development of a comprehensive underground master plan.

Singapore continues to respond to changing factors, to anticipate and reinvent over time by creating and test-bedding innovative urban solutions. In the area of transport, the Land Transport Authority (LTA) is experimenting with a palette of behavioural levers to encourage commuters to alter their travel patterns, to reduce peak transport demand. These experiments allow the LTA to try out new ways to address existing capacity constraints. Some incentives include providing free travel on rail trips into the city for off-peak weekday mornings. Other measures involve working with various organisations to pilot flexible work arrangements that stagger reporting hours, enable working offsite, or give cash rewards for making morning off-peak trips on the rail system.

Looking ahead, the Singapore Government has concrete plans for a paradigm shift to implement the vision of a "car-lite nation". A major initiative involves experiments with autonomous vehicles in a number of precincts in Singapore. Other initiatives include the construction of more pedestrian walkways, pedestrianisation of selected streets, and construction of waterfront promenades along the Singapore River and around Marina Bay.

[5] Public Utilities Board. *Annual Report 2007-2008*. 2008. http://www.pub.gov.sg/mpublications/Lists/AnnualReport/Attachments/4/PUB_AR20072008.pdf [Accessed in 2015].
[6] Ministry of Defence. *SAF unveils underground ammunition facility*. 7 March 2008. http://www.mindef.gov.sg/imindef/resourcelibrary/cyberpioneer/topics/articles/news/2008/March/07mar08_news.html#.V29cZ_nvPIV. [Accessed in 2015].March/07mar08_news.html#.Viol4GXovt4
[7] replace with "Public Utilities Board. *Deep Tunnel Sewerage System*. http://www.pub.gov.sg/dtss/Pages/default.aspx [Accessed in 2015].
[8] Jurong Town Corporation. *Jurong Rock Caverns*. http://www.jtc.gov.sg/industrial-land-and-space/pages/jurong-rock-caverns.aspx [Accessed in 2015].

The National Cycling Plan aims to ramp up the cycling network from 230km today to more than 700km by 2030, and focuses on a combination of intra-town routes, inter-town routes, park connectors and round-island networks. This works out to be about 12km per 100,000 people by 2030, an increase from today's 4km per 100,000 people.

These infrastructural enhancements aim to cultivate behavioural shifts that can generate positive benefits. The increased physical activity and reduction in air pollution can also contribute to a consequent reduction in the strain on the city's healthcare resources and the city's carbon footprint.

Lessening reliance on energy resources can improve resilience against shocks in fuel prices, and the increased usage of public spaces also helps to build stronger communities. Experimenting and implementing these urban solutions will allow Singapore to further enhance its economic, physical and social resilience in the long run.

Complexity science and big data

As urban challenges escalate in scope and complexity, cities also experience a proliferation of new sensing and info-communications technologies. Big data, analytics, modelling and simulation technologies provide useful tools which cities can optimise to enhance liveability through improving the delivery of urban services and managing them more efficiently and effectively.

City administrators can also leverage complex system modelling capabilities and data analytics to more robustly account for inter-dependencies and uncertainties in urban systems, test impacts of policy measures in simulated environments, track and monitor outcomes of plan implementation and develop appropriate intervention measures when necessary.

These are some examples to elaborate how cities can mine data to strengthen their resource, structural and social resilience. Singapore's first disease map was recently developed by the medical technology company Make Health Connect, that puts together a network of 1,200 clinics. It delivers real-time information online, focusing on infectious diseases that patients are consulting doctors for. The disease map shows where viral and bacterial infections have occurred — from dengue fever to chicken pox to upper respiratory disease. Unlike the semantic approach of the web service Google Flu Trends, it is based on actual diagnoses submitted online by doctors in the network, and is refreshed hourly. Such systems remove the need for the traditional method of surveillance that involves labour-intensive and time-consuming collection of static data from hospitals, clinics and laboratories.

The LTA operates a data warehouse, the Planning for Land TrAnsport NETwork (PLANET), which consolidates information from Singapore's public transport, traffic, vehicle and geographic information systems continuously. The accumulated data records, approximately 3.7 billion to date, provide planners with a common understanding of transport issues to both inform and review policy decisions. For instance, when introducing direct bus routes, planners can utilise data on the detailed characteristics of transit commuters along busy corridors in order to design routes and stops for commuters who need direct, long-distance services.

The URA is collaborating with the Agency for Science, Technology and Research (A*STAR) and other agencies to develop an Integrated City Planning (ICP) platform that taps into data mining and analytics, machine learning and complex system modelling to enhance the nation's current long-term land use planning and development process. This platform seeks to help planners plug current data gaps, incorporate feedback loops between variables affecting land uses, and better anticipate and assess the implications on future land use and development needs.

For example, the ICP can enable planners to quickly assess how the spatial distribution of housing and employment spaces translate into the distribution of population and jobs, the level of accessibility to jobs from homes, and the level of utilisation and flow on Mass Rapid Transit (MRT) trains and roads. This can inform future investments into transport infrastructure, the adequacy of amenity provision, or the way employment spaces are distributed.

Similar to the City Dashboard that the City of London and University College London's Centre for Advanced Spatial Analysis are developing, the URA has developed the ePlanner, a geospatial planning data analytics portal. The ePlanner integrates rich geographic information system (GIS)-based datasets, including planning and development data, social and demographic data, people flow and real-time data, feedback and ground-sensing data, and the list continues to grow with the discovery of more useful data applications. This single platform enables planners to access large amount of planning data and carry out quick analyses to inform planning decisions.

Beyond the technology that exists today, government agencies also monitor various emerging technologies that have potential to improve urban living, including machine learning technologies and drone technology.

The URA is also working with partner agencies A*STAR, LTA, and the Info-communications Development Authority (iDA) on using big data, particularly transport cards and mobile data, to better understand the distribution of where people live and work.

Machine learning technologies can help planners process large amounts of crowd-sourced data to pick up "weak signals" that point towards trends, service gaps and the need for improved designs. These are used to analyse millions of records to derive insight into how often people visit a location over a period of time, how long they stay for each visit, their origin and destination locations, their routes and modes of travel. Mining these data provides deeper insights into the interconnected nature of service delivery planning and complex systems modelling. This further strengthens the responsiveness and resilience of the city.

Conclusion

All cities aspire to provide liveable, sustainable, inclusive and resilient environments for their people. In the face of a volatile, uncertain, complex and ambiguous future, the complexity of cities that produces black swan situations and wicked problems places huge demands on governments and municipal authorities. Urbanisation as a driver of the national and world economy creates wicked problems. At the same time, these problems also present big opportunities for cities that are able to reorganise and reinvent themselves to thrive in a fast-changing and complex operating environment.

The most successful and resilient cities will be those that are networked and able to achieve and practise good governance to re-invent and re-position themselves to overcome these challenges. These cities will be those that are able to identify appropriate solutions to urban challenges through connections to a wide network and acquisition of capabilities and top talents. These resources, together with good urban governance, will allow cities to re-invent within a short period of time to stay ahead of the curve.

Managing the complexity of cities with effective urban governance through the application and nurturing of the Whole-of-Government approach, the paradigm of experimentation and the use of scenario planning and big data, will also facilitate better anticipation of potential shocks which could arise. These cities will emerge resilient in the long haul.

THREE

Public Housing

Public Housing in China
Progress, Challenges and Policy Recommendation

REN Xingzhou and LIU Weimin

As an important part of China's public policy system, China's housing security system continues to be explored and developed according to the periodic characteristics of China's situation and urbanisation progress under the background of housing system reform. Under the housing security system, the Government uses public funding and mobilises private capital to provide housing relief or assistance for eligible urban and rural residents to address their basic housing needs and achieve the goal of home ownership. Since the implementation of comprehensive housing reform in 1998, China's housing security system has gradually been developed and continuously improved, which has largely resolved the housing problems of middle- and low-income families, and is instrumental in improving the people's well-being and in promoting social harmony and stability.

Development and impact of China's housing security system

A housing security system with Chinese characteristics was formed and constantly improved. Prior to the policy reform and opening-up, welfare allocation was the focus of China's urban housing policy under the planned economy system where Government and state-owned enterprises were responsible for housing provision. However, there was a housing shortage under that system and as a result, housing size was small and housing quality was poor. From early 1980s, China began reforms towards a market-based housing system. Following Deng Xiaoping's instructions on housing reform, China introduced various pilot programmes such as the sale of public housing and rental subsidy for low-income families, in order to progressively monetise housing provision.

In the 1990s, China's housing reform gained momentum. In 1991, Shanghai piloted housing provident fund. In 1998, the State Council released the Notice on Further Deepening the Reform of Urban Housing System and Accelerating Housing Development (*Guo Fa* [1998] No. 23) ("Document No. 23"), which was a milestone document marking a major breakthrough in China's housing reform. Document No. 23 defined the purpose of urban housing reform, which was to discontinue the welfare housing allocation system, gradually monetise housing allocation, and use affordable housing as the mainstay for developing a multi-tiered urban housing supply system. In 1999, the Regulations on Management of Housing Provident Fund was issued and practised.

In 2003, the State Council issued the Notice on Promoting the Sustained and Healthy Development of the Real Estate Market (*Guo Fa* [2003] No. 18) ("Document No. 18"), a directive that signified major shifts in the approach to housing security. The government would work towards ultimately having most families purchasing or renting commercial housing units, providing affordable housing for low-income families, providing low-rental housing scheme targeting at the lowest-income families. Thereafter, China's commercial housing market developed rapidly, housing prices surged and sustaining housing security became challenging. In 2007, the State Council issued the Opinions on Solving the Housing Problems of Low-income Urban Families (*Guo Fa* [2007] No. 24) ("Document No. 24") focused on low-rental housing-based policy in an effort to provide multi-channel solutions to the housing problems of low-income, urban families. It also focused on improving the affordable housing scheme and the housing provident fund scheme to attend specially to the needs of low-income families. After 2008, China focused on "adequate housing for all" and "improving urbanisation and sustainable development in human settlement", increasing the development of housing security system. Many localities put much effort into the construction of low-income housing, and explored channels of housing security. There was a need to expedite the rehabilitation of large concentrated squatter settlements, and actively revamp old residential areas. This became an important channel in improving the living conditions of urban residents and progressive urbanisation. Since then, China's housing security system Anju (literally translated as, "settled living") Programme was developed comprehensively. [1]

During the 12th Five-Year Planning period, China's housing security system was refined. The State Council put forward to build 36 million low-income homes under the Anju Programme from 2011 to 2015. It was outlined that the development of public rental housing would be a priority, and should

[1] China's housing security programme provides three categories of housing. The first is low-income housing, including low-rental housing, affordable housing, public rental housing, price-controlled commercial housing; the second is the rehabilitation of squatter settlements, including squatters in urban districts, state-owned mines, forestry areas and reclamation zones; the third is the rural dilapidated buildings and the nomadic settlement project.

eventually become the keystone in low-income housing. In 2013, the National Television and Telephone Conference for Rehabilitation of Squatter Areas proposed the rehabilitation of 10 million squatters in urban districts, state-owned mines, forestry areas and reclamation zones between 2013 and 2017. The 2014 Report on the Work of the Government stated that in the near future, the government would focus on issues concerning "three groups of 100 million (*sange yiyiren*)", including rehabilitation of squatter settlements and urban villages in which about 100 million people lived.[2] In 2015, the State Council issued the Opinions on the Work Related to Further Transformation of Urban Squatter Settlements and Rural and Urban Dilapidated Buildings and Construction of Supporting Infrastructure (*Guo Fa* [2015] No. 37), with further requirements on rehabilitation of squatter settlements. The document stated that between 2015 and 2017, 18 million squatters, including urban decrepit houses (*weifang*) and urban villages, and 10.6 million decrepit houses in rural areas will be rehabilitated.

After 30 years of experiment and reform, a multi-level housing security mechanism with Chinese characteristics was formed. It includes a basic housing security scheme targeting low-income urban families which is based mainly on low-rental housing and supplemented by affordable housing (now merged); public rental housing scheme for new employees and migrant workers, as well as middle-to-low-income urban families; rehabilitation of squatter settlements for families living in industrial, mining, forestry or reclamation areas; introducing price-controlled housing (*xianjiafang*) schemes for middle-to-low urban families in some localities. Also, a rehabilitation subsidy scheme targeted at rural families with housing problems was also established. In addition, there are rental subsidies provided to low-income families (Table 1).

[2] Urban villages refer to rural residential areas surrounded by urban built-up areas.

Diversifying investment channels. With the expansion of the housing security project, there is a greater need for funding. Especially in the 12th Five-Year Plan period, more funding was needed as China's large-scale reconstruction concentrated on low-income housing and squatter rehabilitation. Under these circumstances, the central and local government was highly focussed on financial investment of housing security, using subsidies from government funds, loans from financial institution, as well as actively exploring other platforms to attract investments for the construction of affordable housing.

Guangxi province public rental housing estate.
Source: www.535300.net

Table 1: China's current housing security system

Category of Housing Security	*Method of Security Provision*	*Provider*	*Beneficiary and Level of Housing Security*
Rental-housing	Low-rental housing (integrated with public rental housing).	The government funds and builds for the lowest-income families with housing problems.	Extremely low rental.
	Public rental housing.	The central and local governments are the main providers of funding; private capital participates in construction; housing is provided for lower-middle-income and low-income families with housing problems, new entrants to the work force and permanent residents.	Local governments decide on allocation and rental. Rental is usually 20-30% lower than the market level; or, at market levels with different categories of subsidy.
Housing with property rights	Affordable housing.	The government invests or finances, and allocates land.	Low-income families with housing problems. Allocation based on strict criteria and procedures. Clear market transaction rules and withdrawal mechanism.
	Price-controlled commercial housing.	The government organises construction by developers.	Housing provided at controlled prices to lower-middle-income urban families with housing problems.
Rehabilitation of squatter settlements and rural decrepit housing	Rehabilitation of urban squatter settlements, forestry and agriculture reclamation areas, industrial and mining squatter areas, nomadic settlements, and rural decrepit housing.	Mainly invested and financed by the government. Also attracts private capital to provide financing.	Sold to eligible resettled and low-income families. Prices are relatively low.
Monetary subsidies and policy support	Rental subsidies.	Expenditure covered by the fiscal budget.	Target beneficiaries.

First, the central fiscal fund allocates fairly substantial earmarked subsidies. From 2011 to 2014, the central government has provided more than 800 billion yuan for the financial investment of housing security, far surpassing the total amount contributed by 2010. In 2014, the various levels of government raised about 560.2 billion yuan for the Anju Programme, of which 198.4 billion yuan was contributed by the central government, with the amount being significantly higher than ever before. For better efficiency in utilising fiscal funds, the central government allocates squatter rehabilitation subsidies based on a differentiated approach, in that the allocation amount is based on the project size, level of fiscal difficulty and project progress. Priority will be given to the central and western regions and to the more demanding rehabilitation projects. As for the rehabilitation of rural decrepit housing, the priority is on rural households living in Grade D decrepit housing[3] and which are rural *Wubao* households (households enjoying the five guarantees) under distributed care, *Dibao* households (i.e. households given subsistence security), indigent households with disabled family members, and other poor households. The average subsidy for each

[3] Grade D decrepit housing refers to the residential housing that is classified as being dangerous, with its load-bearing structure being unable to meet the normal requirements.

Rural villages before *(top)* and after *(bottom)* construction in Yunnan Province.
Source: DRC Research Group

household is set at 7,500 yuan, and an additional 1,000 yuan and 2,500 yuan are granted respectively to households in poverty-stricken areas and model households living in energy-efficient buildings.

Second, local governments have adopted various measures to bolster construction of low-income housing and rehabilitation of squatter settlements and decrepit buildings. This is supported by increasing funding and by introducing tax incentives and favourable policies pertaining to loans with subsidised interest. Squatter rehabilitation projects that meet the eligibility criteria enjoy deductions or exemptions in corporate income tax, urban land use tax, stamp duty, land value-added tax, deed tax, personal income tax and other taxes. Squatter settlement rehabilitation projects are exempted from paying administrative fees and charges such as urban infrastructure fees, and contributions to governmental funds. Based on the regulations, some projects are also granted loans with subsidised interest (*tiexi daikuan*). Local governments are also helping to facilitate squatter rehabilitation project financing to expedite works-in-progress. In addition, some local governments provide support for the construction of low-income housing by way of allocating land, increasing the proportion of housing security subsidies in land transfer payments and so on.

Third, the implementing parties have been actively exploring other financing channels for squatter rehabilitation projects. One such channel is through bank loans to support the rehabilitation of squatters. According to the principles of risk control and business sustainability, the banking financial institutions improve the efficiency of financial services and increase credit arrangements for squatter rehabilitation projects. Eligible local government financing platforms and companies also earmark the issuance of corporate bonds or medium-term notes for squatter rehabilitation projects. One such example is Anhui Province, which issued revenue bonds, referred to as "project-income bonds" (medium-term notes), to finance squatter rehabilitation projects. When disbursing proceeds from treasury bonds issued on their behalf by the Ministry of Finance, some local governments give primacy to rehabilitating squatter areas and to developing low-income housing. Private capital is also encouraged to participate in the projects by way of direct and indirect investments, shares, entrusted construction and so on. The government actively implements credit policies and eliminates policy barriers for private capital to participate in the projects. At the same time, enterprises are also encouraged to participate by allowing contributions to be deducted from their corporate income tax.

Fourth, efficiently using fiscal resources to support the squatter rehabilitation efforts. In a grand scheme of the project, the State Council has emphasised the need to support the squatter rehabilitation effort using national development finance. Upon the approval of the China Banking Regulatory Commission, the China Development Bank (CDB) established its Housing Finance Department, using the funds available from the People's Bank of China to support the various squatter rehabilitation projects according to market principles and regulations. In 2014, the China Development Bank provided funding of 408.6 billion for the rehabilitation project, supporting more than 30 districts nation-wide, had an impact on 860 million square metres and the relocation of close to 8.75 million households. CDB continues to introduce social capital to support the squatter rehabilitation effort through the use of earmarked funds, the issuance of "debt-loan portfolio" bonds, the sale of medium-term notes, and the innovation on syndicated loans with interest rate differentials, etc. Today, given its relatively low financing cost, unified operation standards and stability as a funding source, CDB has become one of the major financiers for squatter rehabilitation. In 2015, the bank increased its loan support for squatter area rehabilitation and expanded the loan quantum for squatter rehabilitation projects to 700 billion yuan. As the rural decrepit housing renewal exercise intensifies, the Agricultural Development Bank has also actively supported projects of squatter rehabilitation in rural areas.

Actively explore and innovate security methods on demand. Since China's housing policy was fully introduced, the methods for providing housing security has been constantly revised, explored and innovated upon according to the different needs of the market and consumption patterns throughout the different stages. During the initial stages of the reformed housing policy, it has focused on affordable housing and low-rental housing to solve the problems of middle- and low-income families. With the influx of migrant workers in cities and an increase in university graduates, the construction and supply of public rental housing are important tasks, the proportion of which increases greatly in affordable housing. From 2011 to 2012, 4.6 million new public housing units were introduced, accounting for 25.22% of new affordable housing projects in two years. It has resolved housing problems of middle- and low-income families, new graduates and migrant workers.

In 2014, public rental housing and low-rental housing were merged and classified under the public rental housing management system. With the fast development of housing market and rapidly increasing prices of real

estate, some regions actively explored the "Common Property Housing"[4] that meets the criteria of the residents, focusing on resolving the problem of lack of purchasing power. In some cities where the housing price increased rapidly, the housing scheme of "Two Limits" (*liang xian fang*)[5] was also introduced, focusing on resolving problems of the "sandwich class". From 2008, and especially within the "Twelfth Five-Year Plan" period, with the changes in demands of residents and progress of urbanisation, the squatter settlements in towns, mining, reclamation areas, forestry, as well as the urban villages and old residential areas are greatly revamped. There is an increasing emphasis on the rehabilitation of squatters. From 2011 to 2014, the number of housing units used for the rehabilitation of squatters reached 15.64 million, occupying 48.6% of the affordable housing project. In 2015, the affordable housing project planned for 7.4 million housing, and rehabilitation of squatters took up 5.8 million units constituting 78.4% of the total — with an increase of 1.1 million from the preceding year.

Over the recent years, there have been slight changes to the squatter rehabilitation projects, and local governments are increasingly turning to monetised resettlement for squatter rehabilitation. The 2015 Report on the Work of the Government set forth the general requirement to "convert some unoccupied housing stock into resettlement homes", and the State Council's document specifically encouraged local governments to implement monetised resettlement for squatter rehabilitation projects. CDB loans also actively supported monetised resettlement. In 2015, these policies have conduced monetised resettlement, which now represents about 28% of the resettlement units in squatter rehabilitation projects. The monetised resettlement has led to a drop in urban commercial housing stocks, better opportunity for citizens to make decisions and shortened rehabilitation cycles, reducing the financial burden of the authorities. Monetised resettlement will also help resolve the housing stock in cities, especially in tier-three and tier-four cities.

Prioritised land supply for housing projects by local governments. A good land supply is the premise for the smooth implementation of housing security and squatter rehabilitation. The central and local land management departments have given priority to land supply for affordable housing projects, securing planned, systematic and timely land supply.

[4] Local governments and individuals jointly share property rights under the Common Housing Property scheme.
[5] "Two limits" refers to the two requirements for the flat types and price when the local governments sell the land.

First, land application for low-income housing is now processed separately from the once-a-year application for urban land use. Land allocation applications for low-income housing projects are processed separately and may be submitted separately when needed. This has sped up the application process and expedited the allocation from the land quota. Among the 106 cities submitting application for land use to the State Council, 69 cities had submitted their application for land use for housing security. By mid-May of the same year, clear arrangements had been made for the relevant land use plans, so as to guarantee the land supply for the development and rehabilitation of squatter within the same year.

Second, when local governments supply development land, Anju Programme low-income housing projects, especially those under squatter settlement rehabilitation, enjoy priority. These are included in the entire housing land supply plan and are publicised. Local governments form their land supply systems for housing security based on local characteristics. For example, Jiangxi Province demands that its cities and counties must first ensure enough land supply for projects under the Anju Programme, and must include the amount of land required in the annual land supply plan at the start of the year; and in applications to the Ministry of Land and Resources for approval to use the development quota for newly-added construction land, low-income housing projects take precedence. Some local governments even go to the extent of withholding supply of commercial land in areas that fail to allocate enough land for low-income housing development.

Third, strengthen oversight of land use in squatter land rehabilitation. To ensure that squatter rehabilitation land use is carried out according to plan, departments at all levels develop more stringent regulatory measures to regulate land. For example, the Ministry of Land and Resources has stepped up supervision of key areas by conducting on-site inspections and holding meetings with localities with demanding rehabilitation responsibilities. It has also introduced a monthly allocation system that requires all localities to report their land use progress every month for real-time tracking analysis and supervision.

Continued improvements in work mechanisms. Local governments undertake the main responsibility of housing security. In practice, localities explore and develop a series of effective accountability mechanisms. First, there is increased responsibility on the part of local governments to provide housing security in their respective jurisdictions. As directed by

the State Council, provincial governments must be responsible overall for providing housing security. Nearly every provincial government has set up a steering group to coordinate low-income housing development. The steering group is guided by a group leader, and consists of the relevant member authorities. An office is established to coordinate and pursue implementation of low-income housing projects within the jurisdiction. The authorities are responsible for formulating plans, implementing annual housing development plans, and tightening assessment of performance target achievements. Municipal and county governments have identified their specific responsibilities and advancement measures.

Second, plans are developed specifically for the *Anju* Programme, and optimise development layout. Based on the local level of socio-economic development, the government's fiscal capacity, urban planning and land use master plan, most local governments have formulated the plan for rehabilitating squatter areas and developing low-income housing. Within the plan are yearly construction targets established by category. At the same time, local governments optimise the layout and sites of housing project, and strengthen the construction of municipal facilities and public service facilities inside and outside the project. For example, as Sichuan Province implements its urban planning strictly, it also focuses a lot on improving the amenities and spatial layout of developments under the Anju Programme and on the quality of rehabilitation works. Sichuan also prohibits unauthorised increase of plot ratio, and has set a "ceiling" for the development intensity.

Third, the implementation of a more robust target accountability system (*mubiao zerenzhi*) and performance appraisal system. Letters of target accountability (*mubiao zerenshu*) for low-income housing development have been signed between the central government and provincial governments, between the provincial governments and the local municipality and county governments, and between the municipality governments and the local county (or county-level city or district) governments. These are letters that divide and delegate construction tasks for the different levels of government. Some local governments have developed an interview and accountability mechanism that requires submission of monthly reports on squatter rehabilitation progress. Some local governments publicise ranking and evaluation results to the public through the major provincial media channels, and consciously accept social supervision.

Fourth, mechanism to supervise and inspect progress. The national authorities have established a supervision and inspection system for all the relevant projects. To effectively oversee the progress of squatter rehabilitation and low-income housing construction, and the construction quality, local governments have formed inspection teams consisting of officials from the housing, development and reform, agriculture, forestry and various authorities to inspect new construction projects and to obtain a comprehensive understanding of progress. For example, every quarter, the Shaanxi provincial government would send a special inspection team to conduct thorough inspection of the construction progress, allocation and occupation situation of low-income housing units.

China's Urban Housing System Achieves Tangible Benefits. First, the number of housing development projects for rehabilitation of squatter settlements has increased, solving the housing issues of low-income families. From 2011 to 2015, the total number of squatter rehabilitation units nationwide was more than 40 million units for those under construction and over 20 million units completed (Table 2), surpassing "The Eleventh Five-Year Plan" projection for 16.3 million units for construction and 11.1 million completed units. The housing problem was resolved for some low- and middle-income urban households as well as state-owned industrial, mining, forestry, reclamation or coal mine workers. By the end of 2014, by providing physical housing and rental subsidies to support low-rent alhousing, public rental housing, and by rehabilitating and resettling squatter areas, the Government had managed to resolve the housing problems of more than 40 million urban households, which totals to more than 100 million citizens. Of which, approximately 19 million of these households are low-income urban households.

Table 2: The Twelfth Five-Year Plan for Rehabilitation of Squatter Settlements (Unit: Ten Thousand Units)

Year	*2011*		*2012*		*2013*		*2014*		*2015*	
	P	**C**	**P**	**C**	**P**	**C**	**P**	**C**	**P**	**C**
Under Construction	**1000**	**1043**	**700**	**781**	**630**	**673**	**700**	**740**	**740**	**—**
Completed Units	**—**	**432**	**500**	**601**	**470**	**589**	**480**	**506**	**480**	**—**

Source: DRC Research Group
Note: P stands for projected and C stands for completed.

Second, more than 20% of the urban households have benefited from affordable, urban housing projects. During the "12th Five-Year Plan" period, the total number of units for affordable housing projects across the nation was more than 40 million, with the urban households housing security coverage[6] reaching about 16.7%. Together with the affordable housing units completed prior to the "12th Five-Year Plan" period, the urban households housing security coverage of affordable housing projects has reached about 20.4% by the end of the "12th Five-Year Plan" period.

Third, the implementation of housing policies has improved social harmony and stability. The housing security system is an important part of China's public policy, as housing is a key livelihood issue for citizens. During this process, Chinese governmental bodies at different levels have also implemented measures that aim to foster social cohesiveness and a connected community, with the following approaches:

(1) To organise residents to jointly build harmonious communities where residents willingly render help to one another.

(2) To establish skills training centres, in order to help low-income housing residents increase employment skills and offer career guidance.

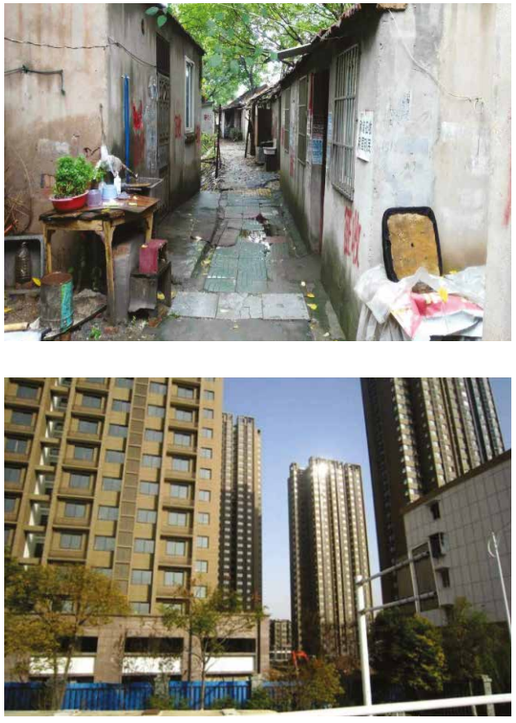
(3) To organise active and healthy cultural activities for the formation to foster optimism and build a progressive environment and eradicates the inferiority complex within individuals.

(4) To scatter affordable housing communities among commercial housing communities so that families from different economic levels live together to bridge the gap between social classes.

(5) To strengthen infrastructure construction of affordable housing communities and their surroundings, facilitating ease of work and travel, and promoting social stability.

Fourth, partly resolving the phenomenon of contiguous squatter areas has pushed China's urbanisation forward. Squatter areas are a specific historical phenomenon during China's urbanisation process. Famously known to be concentrated, highly-dense and accident prone, squatter areas also often suffer from a lack of water and gas supply, and poor sanitation. Some squatter areas are also plagued by prominent social conflicts and poor security. In the recent 10 years, the authorities have revamped the squatter areas by building high-rise buildings to improve both the quality and orderliness of the lives of the citizens, and promote the urbanisation process. In vast contrast to its previous shabby environment, the improvements have led to a more stable society with the primary aim of resolving social conflicts, narrowing social gaps and increasing the residents' participation and passion towards city development.

[6] "Housing security coverage" is calculated by taking the number of households enjoying affordable housing and the rehabilitation of squatter settlements as the numerator, and the number of urban permanent households as the denominator.



Squatter settlements in Jiangsu Province before *(top)* and after *(bottom)* development
Source: Authors

Challenges in the development of low-income housing and rehabilitation

Local funding gap and increasing pressure on mid- to long-term debt repayment of squatter areas. In recent years, the central and local governments have been increasing their fiscal spending on construction of low-income housing and rehabilitation of squatter areas. Development-based financial institutions have also increased their financial support. But the general feedback from local governments is that, compared to the required tasks, the funding gap is still considerably large. After

years of rehabilitating squatter settlements, rehabilitation has largely beencompleted for the large and concentrated squatter areas that are in good locations, where more land has been vacated for rehabilitation, and which were able to rely on commercial development to be self-financed. Current and future rehabilitation works are mainly for squatter settlement that are "tough nuts to crack", in that they are small and fragmented, poorly located, and of low commercial value. Many rehabilitation projects are not capable of self-financing. Their bleak profit prospects also mean that they cannot attract sufficient private capital. Even with long-term and low-interest loans from the CDB, local governments are still seriously short of funds.

"*Chaiqian* difficulty" and increasingly high costs. During the process of *chaiqian*, or "demolition and resettlement", local governments have observed the laws and regulations and protected the lawful rights of squatter residents. Forced eviction by developers, who had obtained demolition and eviction licences from the administrative authorities (*xingzheng chaiqian*), have basically been eliminated. But many local governments have indicated that the different demands of the residents and their rising expectations of the compensation amount are making demolition and resettlement increasingly difficult and costly. This is especially so when the government cannot satisfy the excessive demands of certain squatter residents or take administrative measures to forcefully evict anyone. This has delayed the rehabilitation works of some squatter settlements, and prevented residents who had moved out earlier from moving back into their rehabilitated homes on schedule. Difficulties in commencing demolition have forced some projects plans to be reworked, and this has led to delays in commencement of construction and unpredictable completion dates.

Deficient operations and management system. Following the massive completion of low-income housing projects, other emerging issues such as the maintenance of low-income housing, rent collection, property management and community governance have become salient issues. According to surveys, collection of rental in some low-rental housing communities has been difficult, and property management funds are severely inadequate. Many Anju Programmes did not contribute to the earmarked fund for housing maintenance, and this means that a sinking fund has not been established to pay for future repairs or upgrading of public facilities. This is especially problematic in north-eastern China where the cold period that requires heating lasts very long. Without collecting heating fees, local governments will have to subsidise more. Also, many cities have not set up a low-income housing administration dedicated to managing low-income housing. Currently, most of the management units operate under the local housing authorities, and this means that they operate without a permanent management team or an operating fund.

Inadequate legal framework. Feedback from many local governments reveals that the prevailing policies on squatter settlement rehabilitation are mostly issued in the form of documents, notices or provisional measures, instead of Regulations on Urban Housing Security or Regulations on Rehabilitation of Squatter Settlements. Hence, they have been unable to find legally binding or authoritative policies to support their implementation. For example, demolition and resettlement of "urban villages" is very difficult because of the complexities in the ownership structure, and many homes are illegally built. But "urban village" residents generally demand the same compensation as that for acquiring homes sitting on state-owned land.

The government has not issued any law or regulation relating to acquisition of homes sitting on collective land and criteria for compensation. Local governments can only try provisional measures or negotiate with "urban village" residents on the compensation. Without a legal basis, demolition and resettlement has proceeded with difficulty. In cases where the central government has issued policies or regulations, many local governments have not formulated local regulations or rules of implementation. For instance, in early 2011, the State Council issued the Regulations on the Expropriation of Houses on State-owned Land and the Related Compensation. However, until now, many provinces have yet to introduce local regulations or rules of implementation, such that acquisition and resettlement during rehabilitation of squatter settlements lack the needed basis to operate.

Recommendations to improve China's housing policy system

Projecting and working towards realistic and appropriate performance indicators. The housing security model for affordable housing and rehabilitation of squatter areas works to improve the housing conditions of urban residents and the urban landscape, while also propelling economic

growth for the country. As such, this is not only a project that serves residents, but also works as a development project. However, the resources and capability between cities differ, resulting in a need for a different pace of development. The performance indicators for the rehabilitation of squatter areas should be determined based on the different situations and the combination of factors like the number of squatter settlements, property markets, housing coverage, the debt burden and financial support from the authorities. As to the debt burden, it is recommended that the authorities work within their capacities to maintain a healthy debt level, with the principle of staying "affordable in the short term and digestible in the long run".

Improve "demolition and resettlement" framework to solve "*Chaiqian*" problems. Based on the experiences over the recent years, the different cities are encouraged to provide a transparent and fair resettlement and reimbursement scheme, allowing for the different parties, which are the relevant authorities and citizens, to discuss and reach a common agreement on the resettlement. This solves the *"Chaiqian"* problem by providing an evaluation system, reimbursement conditions and a multi-layered approach for legal protection. In addition, the legal and judicial branch should also intervene and guide residents in housing development projects to ensure a better legal framework. This will regulate the resettlement and reimbursement contract between residents and developers, increase the judicial effectiveness when there are conflicts of interest, and introduce legal protection clauses to the housing development projects.

To aid poor cities financially by encouraging the widening of investment channels. To improve the financial situation of poorer cities, the amount of funding and possible investment channels are encouraged to increase according to the needs of the cities, such as cities in the Central and Western Region, North-eastern Region, absolute mining areas and other least developed areas which require resources for their rehabilitation efforts. For the rehabilitation of squatter areas, and rural dilapidated buildings in western border areas, ethnic minority areas and earthquake or other disaster-prone areas, a certain portion of funding should be allocated and set aside. Making the government participate actively in the different categories of public-private-partnership (PPP) projects also works as a possible financial means for expanding projects in areas where conditions permit. While increasing the earmarked loans to support the rehabilitation of squatter areas, local governments should encourage qualified enterprises undertaking housing projects to issue bonds, innovate bonds products, and increase support for "debt-loan portfolio"; encourage commercial banks to issue bonds and innovate financial products by taking advantage of the inter-bank market, so as to raise funds for housing projects; explore a loans or bonds discount policy for rehabilitation, in order to improve the ability of housing projects to use commercial bank loans and capital market funds.

Improving monetary policies in the area of loan and financial subsidies. The monetary policy for the housing development project should be improved. The following branches like housing, government finance, the Banking Regulatory Commission and audit departments are expected to discuss with the CDB on the loan policies, audit procedures, rehabilitation squatter loans and provincial financing platform to facilitate the smooth running of projects. It is proposed that a more pragmatic and reliable financial policy is framed to ensure that sufficient funds are available for the development work to progress. In addition, the Agricultural Development Bank and other financial institutions are encouraged to actively participate in the housing development projects. According to the CDB's earmarked funding support mode, the People's Bank of China should provide a certain amount of earmarked funds to the Agricultural Development Bank for the rehabilitation of squatter areas and shabby buildings in rural areas, so as to lower the cost of capital, reduce the rate of interest, allow for a longer loan period, and provide stable and low-cost funds. This grants greater flexibility in the financial support of such projects. Allowing county-level housing projects and those below to use credit funds from the Agricultural Development Bank will help improve the efficiency of fund utilisation.

Improve the housing security system and increase the allocative efficiency of public housing. During the "12th Five-Year Plan" period, most of the housing development projects met the expected conditions. However, some housing projects were not met due to a variety of reasons. Thus, it is recommended to respect the desires of the citizens, and encourage the implementation of monetisation policy and the centralised purchase of common commercial housing, in order to bridge the gaps between the rehabilitation of squatters, demands for affordable housing and the requirements for commercial housing. Cities with a lot of idle public rental housing should accelerate the improvement of the relevant infrastructure, explore turning idle public rental housing into resettlement housing, and promote optimal allocation of housing resources.

Home, Community, Identity: *Singapore's Public Housing Story*

CHIONH Chye Khye and Louisa-May KHOO

Beginnings: *To give every citizen a stake*

A home is a place close to the heart of the owner, a prized possession. This was the vision that Singapore's founding Prime Minister Lee Kuan Yew sought to achieve:

My primary preoccupation was to give every citizen a stake in the country and its future. I wanted a home-owning society. I had seen the contrast between the blocks of low-cost rental flats, badly misused and poorly maintained, and those of house-proud owners, and was convinced that if every family owned its home, the country would be more stable.[1]

LEE KUAN YEW
Founding Prime Minister

The quotation above sets out the key national and political imperative of Singapore's public housing story. While others thought that home-ownership was desirable, to Mr Lee, it was vital for Singapore's survival. He was troubled by Singapore's completely urban electorate and had seen how voters in capital cities elsewhere always tended to vote against the government of the day. He was determined that Singapore's householders should become home-owners, otherwise there would not be political stability.

Home ownership would give all parents whose sons had to do national service a stake in the Singapore their sons had to defend. If the soldier's family did not own their home, the soldier would simply conclude that he would be fighting to protect the properties of the wealthy, and why should he? Mr Lee felt that this sense of ownership, instituted through the ownership of homes, was critical for the new society Singapore was building — one which had no deep roots in a common historical experience.[2] However, achieving this vision of making Singaporeans home-owners in a fledgling country was no mean feat.

Colonial legacies

In many ways, Singapore inherited a housing stock from the British colonial powers that was decent, reasonably safe and of sound construction. Stamford Raffles, who founded modern Singapore in 1819, set out regulations in his 1823 Town Plan requiring that buildings be built with brick walls and tiled roofs to reduce the risk of fires. He also mandated a continuous covered public veranda, or "five-foot-way" in front of buildings to shield pedestrians from intense heat, glare and rain. Internally, the traditional courtyard brought natural light and ventilation into the shophouses, making them valuable heritage properties today.[3]

However, this housing stock could not keep pace with the speed at which the port-city of Singapore grew. The population increased rapidly and people were entirely dependent on the city area's activities for their livelihoods. People also would not move further away as it would incur transport costs into the city. Hence, overcrowding became a huge problem in the city centre. Shophouses were subdivided into small, dark and airless cubicles, where entire families dwelled and several single workers shared beds at different times of the day.

Those who could not even afford these cubicles built huts made of attap, old wooden boxes, iron sheets and other salvaged material in illegal squatter settlements. These settlements were congested, chaotic and highly flammable. With the lack of ventilation and proper modern sewerage, the shophouses and the squatter settlements became fire hazards and breeding grounds for diseases. Coupled with ethnic segregation, vice and crime, poor public transport and access to jobs, and a lack of education and cultural facilities, these conditions typified the housing environment in pre-independent Singapore. To address the situation, the Singapore Improvement Trust (SIT), an agency under the British colonial government took on the task of building flats. In its 32 years of existence (1927–1959), it built 23,000 units of flats.[4]

[1] Lee K. Y (2000), *From Third World to First*, Singapore Press Holdings, Singapore, p116

[2] Lee K. Y (2000), *From Third World to First*, Singapore Press Holdings, Singapore, p116-117.
[3] Dale, O-J (1999), *Urban Planning in Singapore: the Transformation of a City*, Oxford University Press, New York, p15
[4] Liu T.K (1985), in Wong A and Yeh S (eds), *Housing a Nation: 25 Years of Public Housing in Singapore*, Maruzen Asia, HDB: Singapore, pg 1.

The Housing and Development Board

The People's Action Party (PAP), which rose to power in the 1959 elections when Singapore gained full internal self-government, formed the Housing and Development Board (HDB) in 1960 to tackle the housing problem. The HDB was constituted as a statutory body originally under the portfolio of the Minister for Law and National Development. In 1975, the Board came under the charge of the Ministry of National Development. It aimed to build as many flats as quickly as possible to alleviate the dire housing conditions which arose from the exponentially growing population.

In 25 years, by 1985, the HDB completed half a million units of public housing flats, with 76% of HDB flat-dwellers owning their own flats.[5] Today, more than 80% of the four million resident population live in close to a million HDB flats, of which 95% are home-ownership flats, and the remaining 5% rental flats.

The public housing programme is an integral part of the overall housing landscape of Singapore, which has benefitted immensely from the strong commitment of the Government. This is seen in the bold vision to provide good quality housing and home ownership for the people, and a tenacity to realise it with legislative support. The Housing and Development Act enabled the HDB to exercise legal authority on matters relating to public housing development and administration. Specifically, it allowed the HDB to prepare and execute proposals, plans and projects for the erection, conversion, improvement and extension of any building for sale, lease, rental or other purpose, and for the clearance and redevelopment of slums and urban areas. By placing both the clearance and housing operations under one authority, the two corresponding processes could be planned in unison and dislocation without rehousing was avoided.[6]

Core commitments of public policy

Although originally intended to provide basic shelter to the poor, the public housing policy objective has evolved to providing homes for the masses — a good housing environment for both the lower- and middle-income groups; homes for ownership, for virtually all Singaporeans who cannot afford private housing; and homes for life, so that the HDB flat is seen as a representation of a component of Singapore's assets that would appreciate over time alongside Singapore's economic growth. Thus, public housing in Singapore is not just about putting a roof over people's heads, but also providing the people with its most tangible stake in the country — building inclusive homes for the majority of Singaporeans.[7]

To do so, the HDB has had to play an active role in the advancement of construction technology and resources, in estate management and urban renewal so that its buildings and neighbourhoods grow in tandem with Singapore's development, and foster a caring and cohesive community for its residents. The HDB follows several national social objectives such as population integration, preservation of the traditional Asian family structure, and encouraging an upward social mobility through providing opportunities for home-upgrading. These represent a total "cradle-to-grave" approach to public housing that is the cornerstone of HDB's success. The following sections outline the factors that have enabled Singapore's public housing story to evolve to what it is presently.

Setting up foundations

Several key principles were the basis of Singapore's public housing policy. First, it was based on home-ownership; second, it would cater to the bulk of Singaporeans, and hence, had to be affordable; third, it was not just about providing houses, but about building homes and communities. To realise these objectives, the CPF Home Ownership Scheme, legislation in the form of the Land Acquisition Act, and innovative construction and planning ideas provided the tools that paved the way for visions to be translated into practice.

The Central Provident Fund

Even as the British began preparations to transfer power to an elected government in the early 1950s, colonial officials had started to look into the issue of social security, and in 1953, passed the CPF Ordinance. This paved the way for the implementation of a fully-funded provident scheme for Singapore called the Central Provident Fund (CPF), for which both employers and employees each contribute a sum of their salaries to the CPF.

[5] Ibid: p1, p 501 (table 3)
[6] Lim H.Y and Lim K.H (1985) in Wong A and Yeh S (eds), *Housing a Nation: 25 Years of Public Housing in Singapore*, Maruzen Asia, HDB: Singapore, p 307.

[7] Mah B.T (2010) *Reflections on Housing a Nation: a collection of commentaries by Mah Bow Tan*, former Minister of Ministry of National Development, Singapore.

To realise a home-owning democracy, the people needed to be able to find the means to finance the purchase of their own homes. This innovation came through the intertwining of the Central Provident Fund (CPF) and the Home Ownership for the People Scheme, hatched by then PM Lee Kuan Yew, Dr Goh Keng Swee who was then Finance Minister, and Mr Lim Kim San, who was then the National Development Minister.[8]

The Home Ownership for the People Scheme

In 1964, Lim Kim San launched the Home Ownership for the People Scheme, with the stated objective being "to encourage a property-owning democracy in Singapore."[9] Under this scheme, newly-built HDB flats were made available for sale to the public. To launch the scheme, some 2,000 two- and three-bedroom HDB flats were put up for sale in the Queenstown estate on 99-year leases for the sum of S$4,900 and S$6,200 respectively. These flats were targeted at lower-middle income people, who would otherwise not be able to afford to buy homes in the private property market then. The Government also put in place restrictions — the scheme was only applicable to Singapore citizens whose monthly household income did not exceed S$1,000. Buyers could only acquire flats for their own residence and they could not purchase more than one unit. Balloting was used to allocate flats to those who registered under the scheme.

Government loans were made available for the majority who could not pay the full price in cash upfront at low interest rates with repayment over up to 15 years. However, buyers would still need to pay a minimum 20% downpayment using their own cash. For the three-room flats, people incurred a downpayment of S$1,200 upfront, and a monthly instalment of S$44. In contrast, a similar flat was rented out at S$60 per month.[10] Yet, the initial response to the Home Ownership Scheme was sluggish — fluctuating from 1,600 flats sold in 1964, to 1,284 in 1965, 600 in 1966 and 1,499 in 1967.[11] Many found it hard to afford the 20% downpayment upfront.

Amendments to the CPF Act in 1968 addressed this concern. The Public Housing Scheme was launched, allowing people to use their CPF funds to pay for downpayments and monthly instalments when buying HDB flats. This policy change brought about a sharp increase in the number of applications for the purchase of HDB flats, and in 1969, 8,048 people registered with the HDB to buy flats.[12] To encourage more people to own homes, a slew of liberalisation measures were implemented in the 1970s, including the raising of the income ceiling for buying HDB flats, and enabling initial payments such as survey and stamp fees to be included into the loan amount. The loan repayment period was also extended to 20 years. To cater to more of the middle class, the HDB also built four- and five-room flats. The intertwining of the CPF Public Housing Scheme and the HDB Home Ownership policy was so successful that it led to concerns from private developers who felt that this encouraged the middle class to purchase HDB flats rather than those in the private market. Hence, in 1981, the Government allowed the use of CPF funds for the purchase of private homes as well, with the Residential Properties Scheme, thus facilitating home ownership for all classes of Singaporeans.

Land acquisition and resettlement

Shouts of "Fire! Fire! Fire!" greeted the afternoon of Hari Raya Haji, 25 May 1961. 16,000 people were left homeless by the raging fires in the Bukit Ho Swee estate that day. PM Lee Kuan Yew declared to the fire victims that new flats to house them would rise from the ground within a year. Amid this bold promise, the Bukit Ho Swee fire ignited a spark of another kind — it catalysed HDB's building programme into first gear — not just to provide proper housing for the fire victims, but to prevent a similar fate for the thousands of others living in squalid, dilapidated slums.[13]

Under these very urgent circumstances, the government decided that they had to break from the mould that the colonial agency SIT had set. The rate of construction was too slow even though the SIT had built blocks of very high standard, such as those in the Tiong Bahru estate. The Government opted for simpler designs so that people could be housed quickly. By the end of its first year, HDB had completed 1,682 units with some 6,608 flats under construction. Some of these rehoused the victims of the Bukit Ho Swee Fire, making good the PM's promise.[14] As the HDB stepped up its building efforts in the initial years, it concentrated on existing estates such as Queenstown, which SIT had begun building, revising it towards a "high-rise, high-density" model, and other areas where pockets of land could be found, such as Tanglin Halt, Selegie and Bukit Ho Swee.

[8] Lee K.Y cited in Fernandez W (2010), *Our Homes: 50 years of Housing a Nation*, Straits Times Press, Singapore, p 57
[9] Housing and Development Board (1964), Annual Report 1964, HDB, Singapore, p 9
[10] Ibid:10
[11] Center for Liveable Cities and HDB (2012), *Housing: Turning Squatters into Homeowners*, Singapore, p 9
[12] Housing and Development Board (1969), Annual Report 1969, HDB, Singapore, p 77.
[13] Fernandez W (2010), *Our Homes: 50 years of Housing a Nation*, Straits Times Press, Singapore, p 41
[14] Ibid:p 49

Before the end of the first decade since Singapore's Independence in 1965, HDB had expanded into the fringes of the central area such as Toa Payoh and MacPherson, and further afield into rural and farming areas, in tandem with the development of the transportation system.

The Land Acquisition Act

A key legislative tool that became indispensable in enabling the HDB to implement its public housing programme was the The Land Acquisition Act (LAA). The LAA enabled the HDB to acquire private land on the Government's behalf. Introduced as the Land Acquisition Ordinance in 1920, this was repealed and replaced by the Land Acquisition Act in 1966. Sparked by the incident of the Bukit Ho Swee fires in 1961 which left 16,000 families homeless, PM Lee Kuan Yew moved to amend the law, allowing the Government to acquire the fire site at the price of vacant possession. He argued that it would be "heinous in the extreme to allow any profit to be made out of this fire. In fact, if any profit is allowed to be made, then it will only be an inducement, a temptation to arson by those who possess land with squatters on it."[15]

Later, the law was further amended to give the Government power to acquire land for public purposes at its value on a date fixed at 30 November 1973. Mr Lee saw no reason why private landowners should profit from an increase in land value brought about by economic development and the infrastructure paid for with public funds. This base year was subsequently moved several times to align it closer to market rates, as Singapore progressed economically.[16]

Looking back, Mr Lee acknowledged, in a candid speech in Parliament in 1985, that the compulsory acquisition of land was a "drastic measure" but he said, "When we were confronted with an enormous problem of bad housing, no development, overcrowding, we decided that unless drastic measures were taken to break the law, break the rules, we would never solve it. We therefore took overriding powers to acquire land at low cost, which was in breach of one of the fundamentals of British constitutional law — the sanctity of property. But that had to be overcome, because the sanctity of the society seeking to preserve itself was greater. So we acquired at sub-economic rates."[17]

[15] Lee K.Y (2000), *From Third World to First*, Singapore Press Holdings, Singapore, p 118
[16] Ibid.
[17] Lee K.Y cited in Fernandez W (2010), *Our Homes: 50 years of Housing a Nation*, Straits Times Press, Singapore, p 61–62

Clearance and resettlement

But relocating people from what they had been used to was an uphill task, even if these existing homes had no proper sanitation or electricity, and were mere slums. It was all they had. Villagers wielded *parangs* (machetes) when they saw government men walking towards them as they knew that that signified impending resettlement, and they did not consider that good news. The former Head of Resettlement in HDB, Mr Lim Hoon Yong, now in his 80s, recounted how he was once visited by burly men, with body tattoos all over, who threatened him if he did not stop the squatter clearance process, and how below his desk he had an emergency button that he could activate to alert the police should he ever have felt at risk.[18]

In trying to understand why villagers were so angry at the prospect of resettlement, Mr Lim also refined the many processes of resettlement. For instance, he discovered that the villagers were only paid their compensation monies after they had relocated from the squatter sites. In listening to the villagers' stories, he realised that much expense was needed in planning for the relocation — in arranging for transportation for the move, transferring children to different schools, in buying simple furniture (once old furniture was dismantled, they often disintegrated), and in paying for the utility bill deposits. So he amended the process to enable compensation monies to be paid upfront to assist the villagers in planning for their resettlement,[19] which in turn earned trust between the government and the people.

This example shows how, in executing large-scale schemes, operational level policies played an important role in contributing to its acceptability. It took some time before the public saw the benefit of resettlement. As National Development Minister Lim Kim San recounted: "I think after a few years, there was no problem at all. When you go in and tell them, 'Look, we are going to acquire this place and we will give you a new house', they were very happy."[20]

The trio of major policies implemented are thus key to this turnaround towards a home-owning society: the 1964 Home Ownership Programme, which promoted the idea of people buying their homes rather than renting; the 1967 Land Acquisition Act, which facilitated the state's efforts to acquire vast tracts of land needed to support the massive HDB building programme; and the 1968 amendments to the Central Provident Fund Act which enabled the use of CPF savings for home purchases.

[18] Lim H.Y (2014), interview with Centre for Liveable Cities, 10 Mar 2014.
[19] Ibid: transcript p 9-10.
[20] Fernandez W (2010) "Our Homes: 50 years of Housing a Nation", Straits Times Press, Singapore, p61

This was evident in the jump in the number of applicants for HDB flats following the 1968 CPF Act amendments.

Controlling construction costs

Raising productivity

To raise productivity, the HDB knew that a key strategy was to manage the HDB's relations with suppliers and contractors. So, the HDB sought to liberalise the construction sector and encouraged more competition to lower construction costs, allowing all who believed they could deliver, to tender for jobs. Lim Kim San, then the HDB chairman, played a pivotal role. He was fair yet tough in his dealings with contractors and suppliers, "We made clear to the contractors that we are going to build on a massive scale and they would be allowed to make money... but not profiteer." He was also strict about getting value for money, and was known to have ordered contractors to rebuild blocks that were not straight, and pulled out electrical wires to have them replaced because they were too thin. He also promised that they would be paid promptly, "if by the 1st and the 15th of every month they are not paid, they can have access to me and I'll find out why."[21] This stemmed corruption and gradually built trust between HDB and the construction industry and the standard of work also improved.

The HDB's senior officials continued this tradition of perpetually seeking to rationalise operations, cut waste and improve productivity. Dr Liu Thai Ker, then CEO of HDB, described several instances of such efforts in the 1970s and 1980s. He noted that one way he could control costs was to benchmark the productivity of HDB's contractors against the world leaders at the time. HDB engaged the Japanese company, Shimizu, to conduct a detailed study of construction work by HDB's contractors in Singapore, with a view to improving efficiency. However, he required that all findings and recommendations be shared with HDB officers, who took such thorough records that Shimizu later even requested a copy for their own reference.[22]

Maximising construction resources

In the 1960s and 1970s, HDB staff were often called upon to find ways around problems that arose unexpectedly in the rush to build new flats. These included shortages in the supply of building materials such as sand, granite, steel and concrete. The HDB's response: it set up quarries and plants to make its own. The HDB built granite plants in Pulau Ubin and Mandai, and a large sand quarry at Bedok. The HDB needed to ensure the continuous supply of key materials for their building programme and that costs were controlled to stamp out suppliers' profiteering motives. Cartels had begun forming and material costs had risen, especially in the 1970s fuelled by the oil crisis and the construction boom. At this critical juncture, these HDB-owned quarries and plants helped to stabilise the market.[23]

In 1972, the HDB also set up a factory to make its own bricks when suppliers could not meet its needs and standards. Dr Liu recalled, "The HDB designed a modular brick which had a bigger surface area so that walls could be laid faster, using less material. We had to make sure that these new bricks were not too heavy so that the workers could hold them with one hand and not be slowed down by them."[24] The HDB continued to make its own bricks till 1998. By then, it had produced enough bricks for a three-metre high wall stretching the entire length of the Great Wall of China. Similarly, between 1963 and 2000, HDB's own quarries in Pulau Ubin and Mandai produced 34 million tonnes of granite aggregate, enough to build 600,000 HDB flats. One of its disused granite quarries in Bukit Batok became a park known affectionately as Singapore's "Little Guilin" in the mid-1980s, as it bore a resemblance to the scenic region in China. In the 1990s, the HDB also stockpiled sand and granite to help maintain a stable supply of these vital building materials and prevent its building programme from being hampered.[25]

Modularised building methods

In addition, HDB tried to control costs and improve efficiency through modularisation. Dr Liu Thai Ker wrote a paper in the 1970s, detailing the benefits of modularised bricks, showing that such bricks used less material for the same surface area. The HDB also found at one point that it faced shortages in the supply of window frames, and instituted a change to standardise window dimensions according to common ones available in the market. Such measures helped to create efficiencies and control building and construction costs.

[21] Lim K.S, Oral History Interview by Lily Tan on 'Economic Development of Singapore' (transcript), Acc. No. 000526/21, Oral History Centre, National Archives of Singapore, 137.
[22] Liu T.K cited in Centre for Liveable Cities and HDB (2013), *Housing:Turning Squatters into Stakeholders*, Singapore Urban Systems Studies Booklet Series, Cengage Learning, Singapore
[23] Lim K.S (2010), cited in Latif A (2010), *Lim Kim San: A Builder of Singapore*, Institute of Southeast Asian Studies, Singapore, p 66–67
[24] Liu T.K (2010), cited in Fernandez W (2010), *Our Homes: 50 years of Housing a Nation*, Straits Times Press, Singapore, p 112
[25] Fernandez W (2010), *Our Homes: 50 years of Housing a Nation*, Straits Times Press, Singapore, p 112

Over the years, the HDB also pioneered and helped spread the precast building of flats, so that more work could be done offsite, put together at a factory and then assembled at the building site. This made it faster, more efficient and cost-effective. An example of this is the 'ready-made' bathroom. Working with suppliers, HDB engineers came up with a fully integrated bathroom system which included a built-in washbasin, water closet and a range of bathroom accessories and lighting. A shallow floor trap was used for waste discharge, which saved space and was easy to maintain. HDB's pilot projects have shown that this has doubled productivity in the construction of bathrooms.[26]

In July 1995, the HDB set up the Prefabrication Technology Centre (now known as the Centre of Building Research), which would become the first centre of its kind in the region to spearhead the use of prefabrication building techniques. In 2009, it was renamed the Building Research Institute to be a focal point for the HDB's research and development efforts. Its vision is to become a global leader in the field of housing research and innovation, especially in environmentally sustainable housing development, with a view to sharing HDB's expertise in this area internationally.

Keeping homes affordable

Over the years, HDB has faced sustained pressure to keep its prices within reach of the people. Better quality design and finishings, as demanded by an increasingly affluent population, added to flat valuations. Many have argued for the HDB to adopt a "cost-based" formula for the pricing of flats since public housing should be sold at subsidised rates, at or below cost. However, doing so is, in fact, less fair to all buyers as the total cost of development a block of flats can vary greatly, depending on design and location, as well as the cost of building materials and land. Ups and downs in the market could also mean that some could end up paying more for their flats than others for similarly-sized flats.

Hence, instead, HDB adopts a "value-based" approach to pricing its flats. This means that prices of the flats are set lower than the price similar flats might fetch on the open market. First-time buyers thus get a big discount since they pay considerably less than what the flats would fetch if they were sold openly in the market. This approach, including the many grants that HDB offers, has helped keep HDB flats affordable to the vast majority of Singaporean households, especially young and lower-income families

[26] Fernandez W (2010), *Our Homes: 50 years of Housing a Nation*, Straits Times Press, Singapore, p 95

HDB offers affordable HDB flats, ensuring that the vast majority of Singaporeans are able to purchase a flat (including young families who are first-time buyers).
Source: Housing and Development Board (HDB)

buying their first homes. Most HDB buyers spend an average of about 23% of their monthly income to service their housing loans.

This is below the 30 to 35% internationally.[27] Tiered subsidies also make it possible for lower-income families to own HDB flats. From March 2012 to July 2014, a total of 1,491 families with household incomes below S$1,000 had booked two-room flats.[28]

Building integrated towns

Beyond the prospect of improved shelter, resettlement to the high-rise, high-density environment of HDB flats was a culture shock for many people, as this was a total disruption to their lifestyle. Many brought

[27] Fernandez W (2010), *Our Homes: 50 years of Housing a Nation*, Straits Times Press, Singapore, p 55
[28] "Singapore Budget 2015: HDB flats have become more affordable, says Minister Khaw", The Straits Times, 10 Mar 2015, (http://www.straitstimes.com/singapore/singapore-budget-2015-hdb-flats-have-become-more-affordable-says-minister-khaw, accessed 7 November 2015)

Building integrated towns that provide facilities and services, which better serve the residents.

Source: Housing and Development Board (HDB)

their *kampong* ways, including their chickens and pigs along with them from their farms to their new HDB flats. The HDB realised that they were not just providing a roof over people's heads — relocation meant much more than moving house. It also meant providing jobs and livelihoods for the new settlers, many of whom had been engaged in informal work such as hawking and living off the products of their agrarian land, as well as inculcating a different lifestyle of HDB living. The minds at the HDB started turning to the need for better planning and design, and a growing awareness among HDB and government leaders that what was being fashioned was not just more and more blocks of flats, but whole neighbourhoods, towns and communities where people could live, work and play.

Physical planning

There were few successful models around the world to emulate at that time, and the HDB realised that they would have to learn by doing, as any experience overseas was also "almost totally irrelevant to (our) local conditions."[29] Dr Liu Thai Ker remarked, "We did not have a good sense of what a new town was, or what a neighbourhood was, or what was required for these... (but) we were conscious that what we did would affect the lives of many people." Dr Liu and his team spent one and a half years thinking, studying and crystallising what a new town was and should be. Through interviews and market studies, new towns were pegged at a size of 250,000 people, underpinned by central concepts of sustainability and self-sufficiency. Neighbourhoods — the next tier, were around 15,000 people (4,000 – 6,000 dwelling units) and about 50 hectares in size, all within walking distance of the neighbourhood centre which would have retail and other facilities for everyday necessities.

Working with sociologists, the HDB scaled down the neighbourhood further to the level of the precinct. Intended to be smallest scale of a community where people could meaningfully relate to one another, precincts were pegged at 700 – 1,000 dwelling units, about three hectares in size. Through urban design and planning ingress/egress movements, the HDB sought to systematically create human-scale communities within the new towns, to help create a sense of familiarity and community among the residents.[30]

Infrastructure planning

The ambitious goal to implement the HDB's vision of an integrated town fell on the shoulders of the many architects, planners, surveyors and engineers who provided the expertise to make it happen. Once the land was cleared of squatters and the new town Master Plan finalised, the civil engineers were the first onsite to obtain a feel of the physical constraints affecting the development.

[29] Liu T. K (2010) cited in Fernandez W "Our Homes: 50 years of Housing a Nation", Straits Times Press, Singapore, p 91
[30] Liu T.K cited in Centre for Liveable Cities and HDB (2013) "Housing:Turning Squatters into Stakeholders", Singapore Urban Systems Studies Booklet Series, Cengage Learning, Singapore, p 35–36

The HDB set up a Civil Engineering Department to be responsible for the foundation of HDB buildings and the provision of sewers, drains, roads and road-related facilities such as overhead pedestrian bridges and bus-stops in all its estates. They designed and prepared plans, and supervised the construction work undertaken by contractors who were awarded contracts via an open tender system. Once the roads, drains and carparks were completed, the electrical and mechanical engineers would step in to install the lifts and electricity and water supply, after which the residents could move in.[31]

The adequacy, efficiency, reliability and security of lifts was a key component of public housing implementation that the HDB paid particular attention to. Its importance cannot be overstated as the reliability of the lift system was crucial to the residents' adjustment to high-rise living as a way of life.[32] In the initial years, many flat-owners preferred to own flats on the lower floors of blocks for fear of being trapped in the lifts, and preferred to walk up the flights of stairs to their homes. In 1971, the Essential Maintenance Service Unit was set up to provide prompt round-the-clock attention to the breakdown of lifts. Better quality lifts were introduced and fitted with automated rescue devices to detect faults and power failure. Closed-circuit cameras and ammonia detectors were also installed to deter crime and urinating in lifts.[33] Over time, people begun to bid for flats on higher floors and were prepared to even pay a premium for them as they had better views. Lift security and reliability had become a non-issue for many residents and the transition to high-rise living was complete.

In each new town, the HDB constructs the roads within the estate to provide access to the various amenity centres and residential neighbourhoods. The HDB works closely with the Land Transport Authority (LTA), responsible for the planning and building of trunk roads and expressways at the national level, to ensure that HDB estates are linked to the city and other parts of the island.[34] Close coordination is required between the HDB and LTA as well, in the envisioning and planning of upcoming estates and transportation infrastructure for both road as well as rail systems, so that access to road and rail corridors can be weaved into the planning and development of HDB new towns from the outset. HDB's ability to plan, coordinate, and undertake the construction and development of the infrastructure necessary for the functionality of an HDB estate was integral to realising the ambition of Singapore's public housing programme.

Providing jobs and amenities

The HDB believed that towns should be self-contained and come with facilities and services that residents would need, preferably within walking distance. This meant locating job opportunities such as factories close by, as well as schools, shops and markets within easy reach. The factories and businesses would provide employment for residents who would find it convenient to work near their homes. Indeed, setting aside land within HDB estates for clean industries soon became a planning principle that allowed the large pool of women and housewives whose children were already schooling to be tapped. The Dutch electronics company Philips built its first factory in 1971 in Toa Payoh, the HDB's first integrated housing estate, and this paved the way for other clean air-conditioned factories to be set up by multinational companies in other HDB estates (such as Hewlett-Packard, Compaq, Motorola, Mitsubishi and Siemens). They provided some 150,000 jobs for women and men, most living nearby, helping to double or treble family incomes.[35] Beyond the big MNC firms, the land set aside for clean industries within HDB towns also housed small and medium enterprises of various kinds, from cake shops to motor workshops, with HDB as the industrial landlord. These provided jobs and helped resettle families who ran small businesses.

But not all the people who had been resettled into HDB estates were adept at factory jobs. Many were itinerant hawkers who had flourished in post-war Singapore when unemployment was high, and hawking was a relatively lucrative trade, requiring little capital and enabling those with no education and few skills to enter the trade. Even after industrialisation strategies kicked in, demand for cheap and convenient hawker food was high, and the number of hawkers increased.[36] Many would continue to set up shop indiscriminately, selling their food and wares to HDB residents.

The HDB, in fact, employed hawker liaison officers to tackle the problem, so that hawkers would not operate anywhere and mess up the new HDB estates. However, after realising that hawkers were an "inescapable reality", the HDB embarked on an experiment to locate hawkers within a fixed place.

[31] Yao C.L et.al (1985) in Wong A and Yeh S (eds), *Housing a Nation: 25 Years of Public Housing in Singapore*, Maruzen Asia, HDB: Singapore, chapter 4.
[32] Ibid:p 139
[33] Liu T.K cited in Fernandez W (2010) "Our Homes: 50 years of Housing a Nation", Straits Times Press, Singapore, p 105-106
[34] Ibid:p 125

[35] Lee K.Y (2000), *From Third World to First*, Singapore Press Holdings, Singapore, p 119
[36] Kong L (2007), *Singapore Hawker Centers*, National Environment Agency, Singapore, p 25

New "hawker centres" were set up to help concentrate hawkers in fixed areas which could be kept neat and tidy, with proper cooking and sanitation services. This would meet livelihood needs, serve residents, and still keep the town clean. So was born Singapore's unique hawker centres, which are located in almost all of HDB's mature estates and which have become very much a part of Singaporean life.[37] The HDB also started building mixed developments in the 1960s with shops located on the lower floors, and flats above, enabling shopkeepers and hawkers who were resettled to keep up their trades close to their homes.

In general, everyday necessities would be situated within walking distances to the neighbourhood centre, while higher-order goods and services such as medical clinics, department stores, cinemas, sports complexes and the library were a short bus ride away at the town centre. HDB estates also boast "green lungs" — town parks that provide relief and recreation to residents. Many of these larger town parks are also now linked by "park connectors" — stretches of pathways along drainage reserves and road reserves to other amenity hubs within the estate and smaller neighbourhood parks for a more continuous recreational experience. Together, these various strategies provided residents of HDB estates, whether by their own volition or otherwise, the opportunity to sustain themselves financially and build a new life for themselves and the generations to come.

The only option: High-rise, high-density living

Singapore is approximately 720 sq km in size. Within this land area is packed all the needs of a nation state — for housing, commercial and industrial facilities, parks, schools, hospitals, military and other uses. The forested heart of Singapore island is also set aside and protected as the Central Water Catchment, where minimal urbanisation is permitted. Thus, the competition for land elsewhere among the various uses is fierce.

Hence, to honour the Government's commitment to house every citizen decently, residential density must be high. Further, to sustain a high standard of living conditions, the dwelling units must be as large as the applicants can afford. To meet the criteria of high density and large flats, the buildings had to be high-rise. As Dr Liu Thai Ker puts it, the "decision on high-rise apartments is not intended to show off economic and technological capabilities; there is simply no other choice."[38]

But to ensure a quality high-rise, high-density living environment, recognising the important of proper maintenance was paramount. Without proper maintenance and management, it is inevitable that estates would deteriorate over time and eventually become slums, and when that point is reached, no one might bother with the development project again. Having seen many such examples overseas where maintenance had been overlooked, HDB Chairman Hsuan Owyang (1983-1998) was adamant that the Division of Estate Management be ranked equally with the Division of Building Development.[39]

Estate management

Estate management has been carried out through a decentralised network of HDB area offices since the 1960s. These were set up to enable the HDB to be closer to the residents it served and to attend to their needs promptly. Each area office managed about 15,000 flats and was responsible for functions such as lease and tenancy management of properties, maintenance of the common facilities in the estate, overseeing the hawkers in the area, the daily cleaning and upkeep of its parks and plants, as well as handling the general finances and administration of the estate. Area offices also worked closely with Residents' Committees to organise activities to foster ties among residents and promote neighbourliness.

In order to do their job well, HDB estate officers played a crucial role in fostering the community development of HDB estates, with their keen sense of awareness and attention to social issues in the estate. These area offices continued to operate until the formation of town councils in 1989, when many of the roles of estate management were transferred to the new councils to allow Members of Parliament (MPs) and residents to be involved in determining the kind of environment and the level of services they want in their estates. This was in line with the Government's desire to help foster stronger communities within HDB estates so that people saw their flats and neighbourhoods not just as shelter or housing, but as their homes, with the attendant ownership and responsibilities that go with it.[40]

[37] Fernandez W (2010) "Our Homes: 50 years of Housing a Nation", Straits Times Press, Singapore, p 94–95

[38] Liu T.K (1985), in Wong A and Yeh S (eds), *Housing a Nation: 25 Years of Public Housing in Singapore*, Maruzen Asia, HDB: Singapore, p 8
[39] Owyang H (1998) "From Wall Street to Bukit Merah", cited in Fernandez W (2010) "Our Homes: 50 years of Housing a Nation", Straits Times Press, Singapore, p 130
[40] Fernandez W (2010) "Our Homes: 50 years of Housing a Nation", Straits Times Press, Singapore, p 117

Social integration

But much still depended on the ability of the HDB to pull together and implement a successful building programme that not only delivered the goods in terms of the "hardware", but also the "software" — communities that would form the bedrock of Singapore society. In pursuing its mission to build homes and not just houses, HDB has never been coy about using its position as the sole provider of public housing in Singapore to shape community attitudes and advance social goals, such as helping young couples buy their first home, assisting the less well-off families in becoming home-owners, boosting inter-generational family bonds, and integrating people across ethnic groups for societal cohesion.

Strengthening family ties

A key dimension of the HDB's social objectives is to encourage Asian values of respect and filial piety and to enable childcare support for working mothers. Hence an array of schemes has been introduced over the years to promote extended family living or proximity living among family members. In 1964, the Joint Balloting Scheme was introduced to allow parents and their married children to apply together for adjoining flats, and in 1982, families applying to live together were given priority over others as well as longer-term loans under the Multi-tier Housing Scheme. Higher subsidies in the form of CPF monies were another way to incentivise proximity living. For instance, families who buy a resale flat near their parents enjoy a higher CPF Housing Grant (of S$40,000 instead of the regular S$30,000) and singles who meet eligibility criteria to purchase a HDB resale flat to live together with their parents also qualify for a higher grant (of S$20,000 instead of S$15,000). Couples seeking to live near their parents also double their chances of getting a flat under HDB's Married Child Priority Scheme.

At a more project-specific level, the HDB introduced two new housing schemes in the mature estates of Dawson and Queenstown in 2009. One is the "Flexi-Layout Scheme" in SkyVille@Dawson. This scheme offers flexibility to families with varying configurations of internal layouts, in accordance to lifestyle needs. The other is a multi-generation living scheme in SkyTerrace@Dawson which allows parents and married children to buy paired flats, such as a four- or five-room flat with a studio apartment. Taking into account privacy considerations, the flats are innovatively designed as two separate units with interconnecting doors.

Encouraging marriage and family formation

Application for a new HDB flat through HDB's Fiancé-Fiancée Scheme has often been seen as a unique form of marriage proposal in Singapore. Under this scheme, engaged couples can book a flat prior to marriage, but they must produce their marriage certificate within three months of taking possession of their new HDB matrimonial home. Indeed, addressing the housing needs of newly-weds was declared by then Minister for National Development Khaw Boon Wan as a key focus area of the HDB. In line with the national policy to encourage the raising of birth rates, Singaporean families with three children or more also get to enjoy balloting privileges under the Third Child Priority (TCP) Scheme when they apply for new HDB flats.

Ethnic integration policy

Perhaps the most far-reaching of its interventions for social purposes is the HDB's policy of insistence that all its estates, right down to each neighbourhood and block, racially mixed, with ethnic groups integrated through the allocation of new HDB flats and resale flats. To do so, the HDB institutes racial percentage limits at the block and neighbourhood level, following the ethnic population composition mix at the national level.

The Ethnic Integration Policy (EIP) works as follows: For new flats, a particular ethnic group will not be able to buy a flat from HDB if the quota limit for that group has been reached for that particular block or neighbourhood. For resale flats, in neighbourhoods or blocks where the limit of a particular ethnic group has been reached, a transaction would be allowed only between the seller and buyer belonging to that same ethnic groups as that would not further increase the proportion of the affected group. However, a buyer of the affected ethnic group cannot buy a resale flat from a seller of another ethnic group as this will result in a further increase in the number of households of that ethnic group.[41]

As then PM Lee Kuan Yew explained, "We had to mix them all up. Those who say we should cancel these restrictions on racial minorities buying and selling, they just don't understand what the racial fault lines are and what the consequences can be. These are safeguards we have put in, which have prevented the communities from fragmenting and being alienated from one another."[42]

[41] Centre for Liveable Cities and HDB (2013) "Housing:Turning Squatters into Stakeholders", Singapore Urban Systems Studies Booklet Series, Cengage Learning, Singapore, p 25.
[42] Lee K.Y cited in Fernandez W (2010) "Our Homes: 50 years of Housing a Nation", Straits Times Press, Singapore, p 107

Social class integration

The mixing of the races also ensured that no estate would have a disproportionate share of the less well-off, and getting the various races to live next to each other also enabled people to see how their neighbours were doing in life. In this regard, the HDB is conscious to have an adequate mix of different flat types (for example two-, three-, four- and five-room flats) located within blocks and neighbourhoods. As Mr Lee said, "The less successful are spread over every new town so you don't have the unsightliness of going into a slum area, where shops are poor, streets are disheveled, people are looking dispirited... This physical landscape and demographic mix that we have brought about, have changed the character of Singapore society."[43]

More recently, Deputy PM Tharman Shanmugaratnam echoed this sentiment, "Once people lived together, they're not just walking the corridors every day, taking the same elevator up and down. Their kids go to the same kindergarten, they go to the same primary school... and they grow up together... Neighbourhoods matter, place matters, where you live matters... It matters tremendously in the daily influences that shape your life."[44]

Not forgetting the less fortunate, however, the HDB keeps a keen eye on low-income and needy families. The HDB recently resumed the building of two- and three-room flats as an option for families who need to right-size due to changing demographics or financial circumstances. Low- and middle-income households also enjoy more subsidies in the form of grants given on top of existing housing subsidies. The Special CPF Housing Grant (of up to S$20,000) and the Additional Housing Grant (of up to S$40,000) are given to families to own homes. A Tenant Priority Scheme is also in place for those wishing to move from rental to ownership priority in their application. However, for those who are unable to own homes, the HDB provides highly-subsidised rental flats under its Public Rental Scheme to eligible Singapore citizens with monthly rents from as low as S$26.

The middle-income "sandwiched" group

The property boom in the 1970s saw many in the growing middle-class priced out of the property market but whose incomes where too high to qualify for new HDB flats. To meet the expectations and aspirations of this segment of the population became a key challenge and a slew of initiatives was introduced to address this "sandwiched" class.

Five-room and executive flats were introduced by the HDB in the 1970s to provide a greater variety of alternative forms of affordable middle-income housing. Executive flats were bigger than five-room flats and had better finishes. The HUDC concept was introduced in 1974, with the government-owned Housing and Urban Development Corporation Pte Ltd (HUDC) constructing flats following the condominium concept where communal facilities such as children's playgrounds and outdoor ball courts were provided. These catered to better-off families and were in better locations, selected to meet the aspirations of the growing middle-class for private home-ownership, with the subsequent conversion of leases in these HUDC estates to strata titles, and the estates privatised if over 75% of the residents supported the conversion.

In recent decades, the Executive Condominium (EC) scheme has been very popular, catering to families with higher incomes, but who still cannot afford private property in Singapore. Launched in 1995, the scheme ensured that those who qualified for ECs were still subject to eligibility requirements for HDB housing, but these eligibility restrictions would be totally lifted after 10 years, after which the units would become private properties. In 2005, to inject greater design variety to meet rising aspirations, the Government introduced the Design, Build and Sell Scheme (DBSS). This Scheme allowed the private developer the flexibility to design, construct and determine the pricing of HDB flats. However, the developer had to ensure that the prices of the flats were still reasonable given that these flats were still subject to HDB eligibility income ceiling restrictions.

Besides these strategies to cater to rising affluence and expectations of the middle-class, greater environmental consciousness has also seen the HDB embarking on efforts towards greater sustainable development technologies. The Treelodge@Punggol, the HDB's first eco-precinct serves as a living laboratory to test new ideas and green technology. Environmental features such as rooftop solar panels, rainwater harvesting tanks and centralised chutes for recyclables on every level were introduced to further enhance green public housing.

[43] Ibid.
[44] Shanmugaratnum T (2015), Interview at the 45th St Gallen Symposium, St Gallen, Switzerland, 7 May 2015.

Providing for other groups of residents

The elderly

Like many cities around the world, Singapore is experiencing a greying population. The number of elderly above 65 years is expected to triple by 2030. Taking this into account, HDB's upgrading programme has sought to incorporate elder-friendly features in the design of its upgrading works. This includes the Lift Upgrading Programme (LUP) which ensures that lifts service every level within the block so that senior residents can move about freely and easily. Within the flats, grab bars, level taps and uniform ground levels, with bathrooms wide enough for wheel-chair access, have been integrated within the works. Studio Apartments (SAs), purpose-built and senior-friendly, enable independent elderly living. They are sold on shorter 30-year leases instead of the usual 99-year leases for new HDB flats, which makes them more affordable. SAs are also twinned with Senior Service Centres, set up in the vicinity to act as all-in-one centres of social services to senior citizens. These centres are equipped with monitoring and emergency response systems to give residents access to welfare and recreational services.

More recently, the HDB introduced the Lease Buyback Scheme, which assists the lower-income elderly to monetise their flats. What this means is that the elderly owner-occupier can sell the remainder of the lease back to the HDB whilst retaining a 30-year lease. So, if the remaining lease on a flat is 70 years, 40 years would be sold back to HDB and the owner keeps the 30-year lease. The government will give a grant up to S$20,000 and the owner receives up to S$5,000 in cash, with the remainder being used to buy an annuity from the CPF Board. This then pays out a steady stream of income to the owner for life. This scheme hence gives elderly home-owners the best of both worlds — a place familiar to them to age in, whilst receiving a monthly income for life.

The singles

Unlike private housing where homes are traded based on commercial principles to the highest bidder, public housing policies are crafted to favour preferred social values and incorporate social policies. The HDB's policies support the Government's stance on the formation and maintenance of family units. A key eligibility requirement to owning an HDB flat is the necessity to form a family nucleus, either with a spouse, parents, or with children if one is divorced or widowed. Hence, singles could only buy a resale HDB flat in HDB estates if they were 35 years old and above. However, recognising that singles are a growing proportion of the populace, in June 2013, the HDB announced that singles could apply for new two-room HDB flats in new estates. To qualify, they have to be over 35 years old and not earn more than S$5,000.

The "newcomers"

Similar to many developed countries, Singapore currently has a very low fertility rate of about 1.2, as compared to the replacement-level fertility rate of 2.1. Coupled with an ageing population, Singapore needs to adopt a more welcoming approach to newcomers into Singapore, so as to continue to be economically sustainable. However, integration into another country's norms and cultures takes time and to ensure that newcomers into Singapore can adjust, the HDB has taken steps to prevent the formation of foreigner enclaves in HDB estates. Hence, foreigners and permanent residents (other than Malaysians) will not be able to rent more than 8% of flats in each HDB neighbourhood, and no more than 11% of units in each HDB block.[45] For this same reason, non-Malaysian Singapore Permanent Residents who want to buy a resale HDB flat can do so provided that they fall within the quotas set at 5% at the neighbourhood level and 8% at the block level.[46]

Building quality homes

From basic to premium design

By 1977, the number of HDB flats coming onstream had exceeded actual demand, and the waiting list for new flats had fallen to a trough. This signaled that it was time to pay more attention to qualitative improvements and this took the form of two main threads: Building better units and upgrading old towns and facilities.

Initially, to solve the housing shortage urgently, the internal floor plans and facades of HDB flats were standardised to enable quick and efficient delivery of flats. As former HDB CEO Dr Liu explained, given the many young and inexperienced architects in the foundation years of HDB, standards, norms and processes had to be established and could not be left just to "individual sensibilities", in the name of "freedom of expression". Consequently, neighbourhoods tended to become similar and dull.[47]

[45] HDB Infoweb,"NC Quota for subletting of flat" (https://services2.hdb.gov.sg/webapp/BR12AWSublettingQuota/, accessed 7 Nov 2015)
[46] HDB Infoweb, "Ethnic Integration Policy and SPR quota" (http://www.hdb.gov.sg/cs/infoweb/residential/buying-a-flat/resale/ethnic-integration-policy-and-spr-quota, accessed 7 November 2015)
[47] Liu T K, cited in Fernandez W (2010) "Our Homes: 50 years of Housing a Nation", Straits Times Press, Singapore, p 92

Over the years, more leeway has been gradually given to designers to allow for variations in shapes, height and features of building designs; integrating relief and iconic natural features into the development and planning of the estate as identity markers; and later, more variations in precinct layout for community interaction, thus boosting the overall quality design of HDB developments. HDB also reclassified their flats into two categories — Standard and Premium apartments, with the latter offering special design attributes and better quality finishes. "White Flats" without internal partitions were also launched in 1999 to meet demands for owners to have greater flexibility in tailoring their flat interiors.

Toa Payoh Estate before the Selective En-Bloc Redevelopment Scheme (SERS).
Source: Housing and Development Board (HDB)

The next phase: Estate upgrading

In the next phase of Singapore's public housing development, concerted effort was made to upgrade all HDB estates and rejuvenate them to keep up with changing times and demands, with the announcement of the HDB's Upgrading Programme in 1989. The Government had several aims it wanted to achieve through HDB upgrading. One was to fulfil the people's expectations of an improved quality of life as their material well-being improved. Second, upgrading provided incentives for the younger population to remain in old-established estates like Tiong Bahru and Toa Payoh. In the 1980s, the Government had noticed the trend of younger families moving out of older estates for newer and more modern flats in newer estates. This would result in transient communities and also cause mature estates to become, before long, "greying" towns before long. The latter would also lead to less economically vibrant shops, and the schools and sports facilities could become under-used.

To stem these trends, the government introduced several initiatives. The Selective En-Bloc Redevelopment Scheme (SERS) was introduced to rejuvenate old estates by building new and higher-density developments on sites that had been vacated by the old blocks that had been demolished. In this way, other younger households could move into these estates with the increase in number of units through these higher-density developments, and the "older" families who were affected by SERS could choose to move back into brand-new replacement flats once they were completed.

Toa Payoh Estate after the Selective En-Bloc Redevelopment Scheme (SERS).
Source: Housing and Development Board (HDB)

The HDB's upgrading programme is carried out at the precinct, block and unit levels. At the precinct level, upgrading included injection of facilities such as covered linkways, landscaped gardens and playgrounds. At the block level, architectural improvements are made to give blocks an identity, with upgraded facades, lift lobbies and entrances. Within the unit, residents can look forward to toilet/bathroom upgrading and extra space with the addition of new bathrooms and kitchen extensions. The new bathrooms would be prefabricated and added onto the existing units. This minimises inconvenience to residents as they are not expected to move out of their homes during the upgrading process.

Upgrading of existing flats also help to maintain the flat's value over time. For the upgrading programme, Singaporeans need to pay only between 7% to 45% of the cost of upgrading works depending on flat type, and the government foots the remaining 55% to 93% of the bill. If the works affected every unit in the block, voting was required to secure a minimum 75% support from residents before upgrading works can take place.

Featuring one of the "Remaking the heartlands" project, the Bedok Town Plaza concept map.
Source: Housing and Development Board (HDB)

Remaking the heartlands

More ambitious plans are also underway in towns such as Punggol, Yishun and Dawson. Titled "Remaking Our Heartland", these plans aimed to turn young, middle-aged and mature estates into vibrant homes for Singaporeans with strategies that go beyond the flat, block and precinct levels for a more "holistic" makeover of the estate. Punggol, for instance, is envisioned as an attractive waterfront estate while mature estates like Dawson would boast more elder-friendly lifestyles and landscapes.

Building communities

The HDB gives considerable thought to the planning and design of its estates to develop "fields of care" — places which may not be visually distinct but evoke meaning for the inhabitants because they create environments in which residents can interact. HDB has, of late, realised that fostering this sense of community in also not just about HDB planning the physical space, but also the sense of satisfaction that comes from giving residents a voice to participate in the planning process. This provides a greater sense of ownership to residents and more attention has been given to encourage active citizenry of residents in recent years.

Harnessing facility planning and urban design

Facilities in part help realise family and other social commitments of residents. Often, the homemakers, elderly and primary school children organise most of their own activities within the estate. Their daily movements are highly localised, usually oscillating between the flats, and common estate facilities such as primary schools, markets, hawker stalls, shops and play areas. The HDB understood everyday lives of the residents' and sought to ensure walkability through conscious planning of neighbourhood layouts, walking routes and connections to these frequently used facilities to foster familiarity and a sense of belonging within neighbourhoods.

Even at the micro-scale block level, design elements were used to facilitate neighbourly interaction. The ground floor void deck, introduced in 1970, was devised to create an informal space for residents to meet and talk. It serves as a social space and shelter from the tropical heat for residents passing through. Before the introduction of the precinct concept, a kiosk selling sundry goods would be introduced in the void deck of every fourth block. Facing the lift lobby, the kiosk-operator helped to keep an eye on visitors and potential crime, and at the same time, the kiosks served to promote chance encounters among residents.[48] Thus, among the estate boundaries, the void deck serves as an important space for homemakers and the elderly to meet neighbours, chat with those they know and exchange news. The schoolchildren meet their playmates in the void decks too. Void decks are also important sites for social and religious occasions and can be decorated overnight for a Malay wedding or turned over the next day for a Chinese funeral. The proliferation of other uses such as kindergartens, clubs for senior citizens, kidney dialysis centres, childcare and student care facilities of late have increased the variety of void deck activity. In some developments, the area in front of the lifts is tiled and further demarcated with a low parapet wall to enable residents to jointly furnish it as their block's "lobby lounge."[49]

The other space in HDB blocks is the common corridor. Sometimes known as "courtyards in the sky", they are linked vertically by staircases and elevators. Beyond just being a means of access for residents to reach their flats, it has become a communal space shared by the families along each corridor. Just like a residential street, it serves as a place where young children can play and where neighbours meet informally. Later, the HDB devised ways to segment its corridors so that each of these served six to eight families to promote better interaction. In newer block designs, the HDB also provided more communal spaces with rooftop and sky gardens. All these initiatives are steps taken to encourage residents to gather and forge a greater sense of belonging to the neighbourhood.

[48] Tan T.K.J et al (1985) in Wong A and Yeh S (eds), *Housing a Nation: 25 Years of Public Housing in Singapore*, Maruzen Asia, HDB: Singapore, p 77

[49] Tan T.K.J et al (1985) in Wong A and Yeh S (eds), *Housing a Nation: 25 Years of Public Housing in Singapore*, Maruzen Asia, HDB: Singapore, p 77.

Open spaces are converted into communal spaces for residents to interact.
Source: Housing and Development Board (HDB)

Community activities

While physical design plays a critical role in shaping the spaces where people interact, the "software" programming is just as important, in promoting active citizenry and giving residents a greater sense of ownership in developing a community spirit. Thus, in 2009, the HDB set up a community relations arm. The department is tasked to formulate and implement community bonding initiatives and outreach for HDB's community engagement programmes. The HDB also brings together different agencies, coordinating their inputs to provide wholesome community activities for residents. For instance, in the case of the Punggol Waterway in Punggol New Town, while the HDB designed and built the waterway and promenades, the Public Utilities Board (PUB) and National Parks Board (NParks) managed them respectively. The HDB then worked with the People's Association to "activate" the use of the waterway through a cross-government agency committee — the Punggol Waterway Activation Group (PWAG) which helps organise and encourage the community to use the waterway creatively for cycling, canoeing and mass sporting events. The HDB also works with NParks on the "Community in Bloom" programme to encourage, through the activity of gardening, a means through which camaraderie and community bonds between residents can be forged.

"Good Neighbour" awards, welcome parties and completion ceremonies are other ways through which the HDB tries to integrate residents into their new homes and communities. As settlements in Singapore had historically been ethnicity aligned, the spirit of neighbourliness across races and cultures had to be cultivated in the new HDB estates. Residents' Committees (RCs) were established in 1978 within public housing estates to foster community spirit. These are voluntary community organisations run by local residents with the fundamental objectives of promoting neighbourliness, racial harmony and community cohesiveness in HDB estates. RCs embark on a wide range of social activities to get residents to interact and feel part of the community. The HDB plays a supportive role in providing the necessary infrastructural facilities and liaison officers for the RCs. The Citizens Consultative Committees (CCCs) and Town Councils (TCs) were other ways through which residents could be involved in activities of the estate. The Neighbourhood Renewal Programme (NRP), introduced in 2007, also sought to encourage citizen involvement by seeking residents' inputs when proposals were drawn up to upgrade and improve the precincts. Thus, beyond physical design, cultivating the "heartware" and community spirit, through appropriate processes, is key to building communities.

Residents participating in the "Community in Bloom" programme.

Source: National Parks Board (NParks)

Reflections

In just over 50 years, the HDB has transformed Singapore's housing landscape from one of squalor to one in which quality homes meet the aspirations of an increasingly affluent society. Indeed, the HDB was conferred the United Nations Habitat Scroll of Honour award for providing one of the greenest, cleanest and most socially-conscious housing programmes in Asia and the world. This is no chance outcome, but a combination of bold vision, strategic thinking and tenacious implementation.

HDB adopts a life-cycle approach to cater to Singaporeans at different stages of their lives. First, it helps young couples buy their first flat through generous housing subsidies, and provides a "second bite of the cherry" to upgrade to another flat as the family size grows. Second, HDB helps to maintain the value of ageing HDB flats through an extensive upgrading programme. Third, when owners retire, HDB helps them to unlock the value of their flats by rightsizing to a smaller flat or subletting their rooms or flats. Housing, through HDB flats, thus becomes a part of the larger social safety net for many residents.[50]

The principles of the concept of majority home ownership, and wide coverage, is unlike other public housing programmes in the world which often target the very poor or are based on a rental model. Singapore has developed a unique housing model over the last half century, with innovative solutions that helped eradicate homelessness, achieve one of the highest home-ownership rates, and build an inclusive community amid a more diverse population with varied needs.

Right from the start, HDB was fortunate to have men at its helm who lived by the credo of "what works" and were single-minded in their focus of delivering results. They knew they had a problem that had to be fixed and in a hurry. People needed homes and these had to be built quickly, and cheaply. Land had to be acquired. Slums had to be cleared. Corruption and bureaucratic inertia had to be overcome.[51] Such a "can-do" attitude paved the way for the successful physical transformation of Singapore. And this spirit of HDB leaders and their dedicated staff, along with the strong support of the Singapore Government, enabled the HDB to deliver its ambitious programme to house the people.

[50] Cheong K.H (2012), interview by the Centre for Liveable Cities, Singapore, 26 January, 2012
[51] Fernandez W (2010) "Our Homes: 50 years of Housing a Nation", Straits Times Press, Singapore, p 225

This same spirit has led the HDB to adapt the number and type of flats it builds, improve on its designs, and go back to the estates to refurbish them to keep pace with the nation's progress and rising affluence. But, apart from the hardware of housing, HDB also sought to continually develop the social software to foster communities and root people to their collective home, to the extent of insisting on a good ethnic and socio-economic mix in its estates through quotas and policies, which to outsiders might seem intrusive. As the current CEO of HDB, Dr Cheong Koon Hean, noted, the challenge is to develop "policies with heart". As a custodian of public housing, the HDB practises a fine balancing act administering the various housing schemes and the social values they represent. Changing social norms, lifestyles and demographics over time would see the HDB continuing this delicate task of ensuring that housing policies meet the goal of an inclusive society, equitable for all.[52]

Public housing has helped to mould a unique national identity and collective experience as Singaporeans, and has shaped a common ethos among residents. This is reflected in the many shared everyday moments and reference points that Singaporeans have in HDB towns with their neighbourhood centres and playgrounds, hawker centres and wet markets, void decks and lift landings.

The public housing model however, cannot be static, and as shown, the authorities had to regularly adapt policies and introduce new ones to address what they saw as befitting the social tempo of the time. The challenges of an ageing population, growing income inequality and an influx of foreigners will continue to pose new questions for housing policy-makers. The test of its success will remain whether the state can continue to provide a high quality of life to the vast majority of people. This will entail not just attractive and affordable flats, but also housing estates that offer a high quality of life, and vibrant multicultural communities that remain socially and politically at peace with themselves.

[52] Cheong K.H (2012), interview by the Centre for Liveable Cities, Singapore, 26 January, 2012

FOUR

Urban Infrastructure Financing

PPP
Driver Of China's New Urbanisation Approach

WANG Yiming, MENG Chun, WEI Jianing, CHEN Chansheng, ZHUO Xian and WANG Yingying

The 3rd Plenary Session of the 18th Communist Party of China (CPC) Central Committee has proposed that China "adhere to the new approach to urbanisation with Chinese characteristics (*jianchi zou zhongguo tese xinxing chengzhenhua daolu*)" and that it should "promote innovative urban development and management approaches, develop transparent and unified investment and financing mechanisms for urban development, allow local governments to issue bonds or rely on diversified means of urban development financing, permit private capital to invest in and operate urban infrastructure through concessions or other arrangements".

Given China's weakening economic growth, the local governments' increasing ineffectiveness in obtaining financing, and the steady rise in demand for public services, China must find a way to reform its investment and financing systems and governance model to harness the potential of private capital. These are factors that will alleviate the financing pressure on local governments and increase efficiency in the delivery of public service, which are crucial to stabilising growth, economic restructuring and reducing risks. Public-private-partnership (PPP) is a model in which the government and private capital cooperate and share the benefits and risks over the long-term. Internationally, the PPP is a rather matured model with many successful experiences. Actively applying and promoting the PPP model could help resolve investment and management problems arising from urbanisation. It could also prevent and balance the inherent risks in urban management and operations, and help ensure the sustainability of the "new approach to urbanisation".

The traditional approach to urbanisation: The drawbacks

In March 2014, the Chinese government announced in the "National New Urbanisation Plan 2014-2020" that urbanisation will focus on a few key areas of development such as facilitating mobility from the rural to urban areas, optimising the layout and pattern of cities, enhancing sustainability of urban development, promoting urban-rural integration, perfecting urban development mechanisms and securing the implementation of plans, etc. A "human" element, which focuses on raising the standard, infrastructure and sanitation for the residents, is also a key factor for urbanisation as announced in the Fifth Plenary Session of the 18th CPC Central Committee in October 2015. Recommendations for the 13th Five-Year Plan for Economic and Social Development by the Central Committee for the Communist Party of China (CPC) were passed in the Fifth Plenary Session of the 18th CPC Central Committee at the end of October 2015. It was proposed that China should promote human-centred new urbanisation and improve the level of urban planning, construction and management. Under the background of building new urbanisation, China's future financing of urban infrastructure is facing two problems including great capital requirements and a long cycle of return on investment.

In addition, inefficient use of funds prevents urbanisation from proceeding based on scientific rigour. The amount of investment and financing available and how these resources are efficiently used immediately determine how well cities are developed and managed. Urbanisation that is government-driven would go as far as the local government financial capacity permits. The government receives most of its revenues from taxes, government fund income, income from transfer of land use rights and loans from local government financing vehicles (LGFVs). In addition, some special transfer payments are given in dribs and drabs, and could not be used as urban development funds synergistically or efficiently. Urban development requires substantial investment for the construction and management of infrastructure, public utilities and public services. However, given the government's limited fiscal strength and financing capability, as well as inefficiency in resource allocation, the funding available may fall far short of the amount of investment required to enable urban development to progress or urban management to gain strength.

Futhermore, the mounting debt risks of local governments affect the sustainability of urbanisation. Under the current fiscal and taxation systems, local governments finance urban infrastructural developments and operations by transferring land use rights. Due to the unique land ownership regime in China, many local governments have become overly-dependent on selling land rights to pay for urban development. A World Bank report shows that for infrastructure development, land-related means of financing account for 80% to 90% of the total infrastructure financing. Over-dependence on land-derived income undermines the

vitality of development,and impairs the quality of industrial development and economic transformation. It also infringes on the rights and interests of future generations and weakens the foundation for sustainable urbanisation. Given that land is a limited resource, and with the introduction of real estate regulatory policies, "fiscalisation of land use (*tudi caizheng*)" cannot be sustained. Similarly, debt-financed development is non-sustainable due to potential systemic risks.

Nowadays, local governments tend to borrow to finance urban development and their credit risks have been increasing. LGFVs have mushroomed in recent years and have provided local governments with broader financing channels and innovative financing approaches. They have been a major driver of local economic growth and urbanisation. At the same time, LGFVs have been blamed for the rapid rise of credit risks. According to the National Audit Office's "National Audit Report on Government-Related Debt" issued in end-2014, 23 of 29 provinces are dependent on local land revenues to repay debt, and this is a main problem of the government debt management. There is high reliance on local land revenues. Second, due to scarce land resources and government's tight control on the real estate industry, it is unsustainable to rely on "land finance". Such high debt levels reveal the massive shortage of funding needed for urban development and undesirable local fiscal situation which stifles the process of urbanisation. As such, a new approach for urbanisation, which increases the technology, investment and sustainability, is required. Hence, the new urbanisation strategy has new demands on the local government. It is to build specific, transparent, diversified and sustainable urbanisation and enhance funding mechanism. This is significant to push forward an efficient, inclusive and sustainable urbanisation.

PPP: *A mechanism of reform in the new approach to urbanisation*

The new approach to urbanisation differs from the traditional approach in that it demands more in terms of the quality of urban development and management. It emphasises on a "human" element. In reality, the market, not government intervention, is the factor which drives urbanisation. Therefore, the roles of the government and market should be well-balanced, such that while the government guides and supervises, market forces determine the best allocation of urban economic and social resources.

To meet the huge funding needs for urban infrastructure development and ensure efficient use of funds, the common international practice is to establish private-public partnership, for which the tax system (mainly property tax) and the project investment returns guarantee repayment, while diverse financing channels and reasonable pricing mechanisms attract market participation. Hence, the PPP model is highly recommended by the World Bank, the Asian Development Bank and other international organisations.

Under PPP, production and supply of public goods are separate processes. The public sector leverages the operating efficiency of private businesses and competitive pressures to achieve better technical efficiency and supply of infrastructure and to improve public services. By entering into a contract or agreement, the private sector reduces possible losses caused by the government's wilful use of discretion, as well as maximises private returns, which is the private sector's main purpose for participating in PPP projects. PPP is not simply a microlevel financing tool; it is also an institutional and mechanical innovation at the macro-level. In terms of improving urban operations and management, broadening financing channels and preventing fiscal risks, PPP carries theoretical and practical implications.

First, PPP engenders more robust urban management systems and mechanisms and improves the quality of public goods and services. It introduces competition and attracts private capital into supplying public goods. It also creates customer-oriented performance evaluation systems and fund allocation mechanisms that motivate private investors to improve management in order to reduce costs, which aligns with the principle of incentive-compatibility. PPP helps drive modernisation of governance systems and management capabilities. Under the PPP model, public sector and private investors are equal players as both must fulfil their contractual obligations and observe the spirit of the law and contract. Levelling the playing field in turn advances modernisation of governance.

PPP is an effective thrust for transformation of government functions. The PPP model requires the public sector to transform its role from from a player to a referee, and from a project implementer to a project supervisor. This allows the government to intervene less in the details, while the market mechanism is given full play as a modulatory force. This way, the government could devote more energy and resources to planning and regulating to improve public administration. PPP is an important means that allows the market to decide. In standard PPP models, private

investors are required to participate in the preliminary design and planning of projects involving delivery of public goods and this prevents poor government decisions and wastage of resources. As the government's approval powers are progressively reshaped and as urban development and management progress, the areas where the market could play a bigger role would continue to broaden.

Secondly, PPP can ease the government's short-term funding pressure and expand the scope of investment for private capital. As the new approach to urbanisation unfolds, PPP could introduce private capital into infrastructure investment and financing to help alleviate the government's short-term financing pressures, thereby resolving the problems of credit risk and funding shortage. Thus, PPP is a vital innovation in investment and financing mechanisms for urban development and management.

Experience at home and abroad has proven that well-operated PPP projects can save substantial fiscal input by attracting private capital, so that livelihood enhancement projects (minsheng gongcheng), which the government cannot accomplish alone within a short time, could be initiated and completed, with social welfare enhanced. By saving on the preliminary investments, the government could then focus its limited financial resources on improving social security and other areas involving the people's well-being for better social harmony. PPP also enables efficient use of funds. Taking urban public utilities projects as an example, if the government initiates and runs the project, problems such as overstaffing, high costs and low efficiency would typically emerge. However, under a PPP arrangement, provided that public services standards are met, private investors try to maximise returns and are driven to use their money most efficiently and to minimise cost.

Finally, the PPP model enables spreading of risks in the development, operation and management of urbanisation. A reasonable risk-sharing mechanism is critical for successful implementation of a PPP project. PPP in the new urbanisation approach implies that the government does not assume all the risks; instead, it effectively distributes technical risks, completion risks and construction risks to its partners in the private sector, which is more risk-resilient. PPP also builds and improves the modern fiscal system and better averts and mitigates fiscal risks. For example, quasi-public projects that generate returns could leverage on PPP arrangements to manage existing debt. For PPP to attract private capital, the government must put in place a fiscal system that aligns with private sector expectations. On one hand, the budget must be open and transparent with better disclosure of public debt. On the other hand, a PPP arrangement runs throughout the entire project cycle; the government must gradually shift from an annual budgeting and income-expenditure management regime to a medium- to long-term fiscal planning and asset-liability management regime, as this will enable better fiscal planning and sustainability and prevent and mitigate long-term fiscal risks.

Advancing the PPP Model: *China's progress*

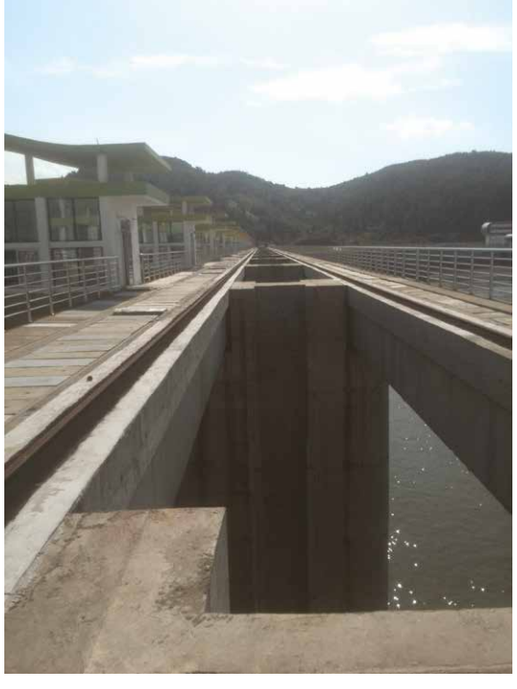
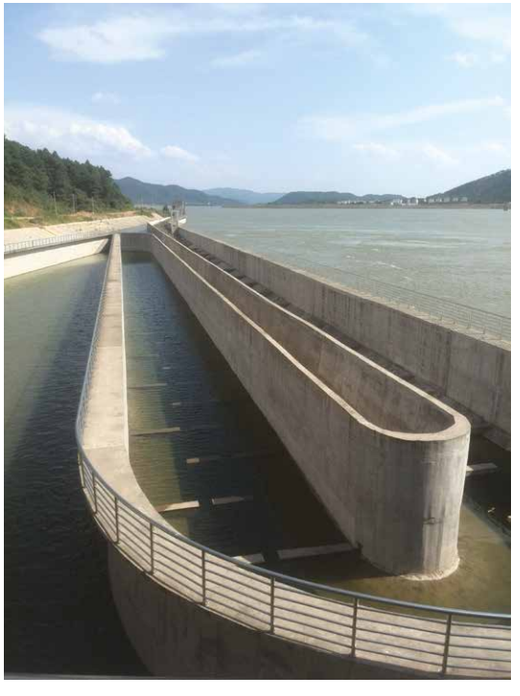
Currently, as the investment and financing mechanisms for new projects have not been streamlined, PPP has become an important approach, which local governments rely on to stabilise investment and growth, facilitate reform of the investment and financing systems and accelerate transformation of LGFVs. All levels of government, private capital and financial institutions have done much to advance the PPP model. However, despite having devoted much effort to PPP work and although some progress has been achieved, many problems have surfaced.

Situation Overview

Since 2014, to encourage and promote the PPP model, the various levels of government have introduced PPP-related policies. The preliminary policy support framework covers incentives, guidance, standards, evaluation, appraisal, supervision, management, risk prevention and control, financial support and supporting measures. The Ministry of Finance and National Development and Reform Commission (NDRC) have announced 30 demonstration projects and 1,043 PPP introductory projects. At the local level, governments have developed both province-level and city-level projects based on local circumstances and the projects cover various areas such as health and senior citizens care, ecology and environment protection, infrastructure, transportation and energy. These projects are rolled out nationwide with varying degrees of progress.

In summary, as the existing investment and financing mechanisms are in the process of being transformed, the more structured PPP model has replaced the old model in some ways and has mobilised private capital to invest in the development of infrastructure and public services. This has, to some extent, stabilised local investment growth. PPP is also beginning to show its advantages in relieving the debt burden of local governments, especially in urban infrastructure projects with stable returns, such as



NDRC PPP Pilot Projects: The Xiajiang Water Control Hydropower Project in Jiangxi province.

sewage treatment, and supply of water, power and heat. Furthermore, not only does the PPP model bring in private capital at the investment and development phase of public service projects, it also introduces professional management and operation in the operational phase, so that professional work is left in the hands of the professionals and public services are delivered efficiently.

Disparate reception and response

Promoting PPP is an important means to drive the reform of investment and financing system and to modernise governance. However, because of many misalignments between the demands of the PPP model and the current institutional frameworks, PPP has received highly disparate reception.

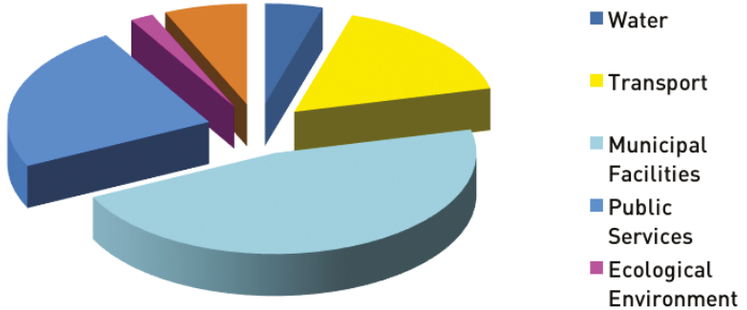
Private capital: state-owned enterprises v. private enterprises. In China, the private capital currently invested in PPP projects is mainly contributed by state-controlled and state-owned enterprises and financing vehicles. PPP projects with private enterprise participation are few and far between. One of the reasons is the low returns. PPP investments in the profitable sectors are relatively adequate and new projects that are suitable for PPP, such as public water conservancy, are either low in profitability or unprofitable; or projects such as railway and highway construction in the western region have typically long profit cycles and low returns; or in some cases, the profit objectives conflict with public service objectives, such as in health and medical services.

The second reason is that private investors are doubtful of the government's credibility. In previous PPP projects, changes of government and strained finances have resulted in some local governments delaying payment. This has undermined the governments' credibility and led to the private sector's distrust of the government. Uncertainties in the law, tax and land policies also prevent private investors from entering into partnership with the public sector.
The third reason is the lack of eligible private investors, that is, strong private enterprises that are experienced in

operating and managing PPP projects. Misconduct among some private sector players and their excessive expectations on investment returns are also the reasons for governments, in their attempt to avert potential risks, preferring to work with state-owned enterprises.

Financial institutions: China Development Bank v. commercial banks. With the ongoing reform of policy financial institutions (*zhengcexing jinrong jigou*), China Development Bank (CDB) must also transform itself. In the past, it depended on granting loans to LGFV, but this is no longer a sustainable approach. And given that the "three unifications (*sange tongyi*)" (unified rating, unified credit granting and united borrowing and repayment) model will cease operating at the end of this year, CDB is working harder to find new borrowers and operation models. This is why it is actively cooperating with local governments and entering into credit facility agreements for PPP projects. CDB is also providing capital as a direct shareholder and helping local governments to establish PPP guiding funds or PPP investment funds. In stark contrast is the cold reception of commercial banks because of policy uncertainty pending the regulatory authorities' announcement of PPP supporting policies. Some commercial banks only renew loans for existing projects but do not finance new projects.

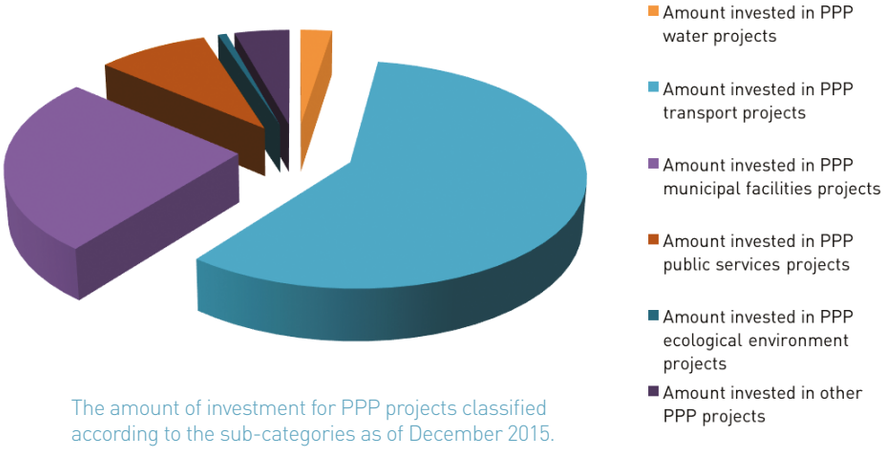
Project sectors: infrastructure v. public service. Whether initiated by the central or local governments, most PPP projects are infrastructure projects; very few are public service projects. NDRC initiated 1,043 PPP projects, but only 266 or 26% are public service projects. Out of the first 30 PPP demonstration projects that the Ministry of Finance has launched, only three are in healthcare, education, senior citizens care or environment protection (two in comprehensive environmental treatment and one in healthcare), which account for only 10 per cent of the total.



The classification of the number of PPP projects as of December 2015

Source: National Development and Reform Commission of the People's Republic of China (NDRC)

Project scale: large projects v. small projects. Governments tend to go for large-scale projects. For example, the average investment size for 158 projects in Guangdong Province was RMB2.14 billion, of which 40 or 25.32% are less than RMB100 million in investment value, and 19 or 12.03% of the projects are less than RMB50 million. In Sichuan province, the 705 projects average RMB556 million in investment value. Of these, 273 projects or 38.72%, are less than RMB100 million in investment value, and 166 projects or 23.55% are less than RMB50 million.



The amount of investment for PPP projects classified according to the sub-categories as of December 2015. (Unit: Ten Thousand Yuan)

Source: National Development and Reform Commission of the People's Republic of China (NDRC)

Project nature: construction phase v. post-construction operation phase. Both local governments and private investors prefer to focus on the construction stage, which is the early-stage of project development. They are less interested in projects involving the later operations stage. Local governments that have to meet the higher level governments' demand to "stabilise growth" tend to focus on the short-term effects as well as on the project development and construction. Similarly, private investors who are interested only in "making quick money" prefer to generate quick profits and cash flow at the early-stage development. They are not interested in operating and maintaining the project and will try their best to enter into repurchase or subsidy agreements with local governments, so that they could transfer operational risks to the local government.

PPP purpose: financing v. governance reform. By creating partnerships between the local governments and private investors, the PPP model is intended to increase the supply of public products and services and improve their delivery quality and efficiency. To do that, all levels of government must push for the reform of the governance system and improve their governance capabilities on all fronts. Unfortunately, the current situation seems to show that most local governments only consider PPP as a new financing model that replaces LGFVs. They do not understand the significance behind the PPP model and that PPP could play a positive role in driving the transformation of the government's functions, in reforming the governance system and in improving governance capability. Many governments who are reluctant to change are only interested to "wear new shoes but stick to the beaten path".

Building a robust PPP model for the new approach to urbanisation: *Some recommendations*

Whether in creating innovative management systems, delivering better capital efficiency, supplying more public goods or preventing fiscal risks, to develop and manage the new people-centred approach to urbanisation, the PPP model must be properly applied. For the PPP model to take flight, patience, perseverance and an unswerving spirit is necessary. To apply the PPP model in a more structured manner and for it to achieve the best outcomes, the following should be done.

Establishing an efficient and coordinated advancement mechanism. The different departments must foster greater interdepartmental coordination, create more rigorous policies and systems, and prevent policy conflicts. The central level must establish a coordinating department responsible for providing policy guidance and master planning and for ensuring overall balance. The coordinating department should work with other departments to screen PPP projects and perform preliminary reviews and approvals of investments. It should also create a centralised PPP project bank and database to enable sharing of information and best practices with different localities.

Local governments should improve operating efficiency by forming PPP steering groups headed by provincial leaders. A PPP management centre comprising personnel from the development and reform commission, department of finance and the administrative authorities for different industry sectors could be established under the steering group. By integrating the responsibilities of different departments, the centre can better compare, select and prioritise projects, and create a transparent and one-stop implementation mechanism.

Generating interest among private investors. First, setting a rational pricing mechanism is required. Public services, including water, electricity and gas supply, should pursue active price reforms. Based on the different payment mechanisms such as government payment, user charges and viability gap funding (VGF), governments should determine scientifically the operational subsidies, operation and fee-collection rights and other payment considerations relating to the project. They should also develop a dynamic adjustment mechanism pertaining to public service prices and subsidies by linking it with Consumer Price Index, actual usage and other indicators. Governments should also ensure that they always priced to cover cost, offer value for money, and maintain fair sharing of burden to benefit both the private investors and the public.

Second, flexible incentives must be offered. For PPP projects with low profitability or those that do not guarantee returns within the concession period, the government could allow partner companies to carry out appropriate commercial development within the scope of concession, and guarantee that it will not build another similar facility during the operation period of the project.

Third, creating a government credit control mechanism would be beneficial. To ensure the consistency and transparency of PPP policies, local people's congresses of the same level or higher level authorities should supervise the local governments' performance of PPP project contracts and fulfilment of its payment obligations. A national-level platform on government credit status in public investment should also be established to monitor the credit performance of governments. The PPP contract should stipulate the applicable law for legal protection and the dispute settlement mechanism and should indicate that, in the event of a dispute, the relevant parties agree to refer the case to a higher level court or that they agree to refer the dispute for arbitration in another jurisdiction to minimise potential intervention by the local government.

Improving the implementation capabilities of local governments. First, the government should improve their professional capability as a "project partner". The PPP model is highly technical and involves professional

expertise such as planning, construction, finance, law, accounting and treasury issues. Government officials should undergo more rigorous training, more professionals should be recruited and more management expertise introduced to form a pool of inter-disciplinary talents with both professional knowledge and practical experience.

Second, the ability to regulate access should be enhanced. The government is responsible for regulating who has access to PPP projects and who can become concession operators. Thus, it should be able to apply the tools of value-for-money (VfM) analysis skilfully. Projects that require fiscal subsidy because revenue does not cover cost and projects involving full payment by the government must be subject to quantitative analysis of the fiscal expenditure incurred during the project life cycle. Financial affordability and risk control must also be thoroughly considered. The government should also improve its ability to identify good concession operators through competitive selection.

Third, the ability to regulate performance should be enhanced. The government should expedite development of industry-based technical standards and technical specifications for public goods and services to unify the standards for ex-post supervision and performance evaluation. It should also monitor the quality and pricing of public goods and services throughout the implementation of PPP projects to ensure consistency in service quality and to prevent disguised increases in charges and change of use of project assets.

Creating a more robust legal and policy framework. A unified legal and policy framework provides a rational coordination and regulatory basis to settle disputes arising from PPP contracts, which in turn better assures and attracts investors.

First, the framework should expedite research and legislation of PPP-related superior laws. Laws enacted by the National People's Congress (NPC) are more effective for regulating the market order of PPP activities than lower-level regulations issued by PPP-related authorities. NPC-enacted laws, being superior laws, will reconcile the conflicting policies between ministries and between central and local governments and will reduce the concerns of private investors on possible policy changes affecting PPP projects, as they have typically long investment cycles. NPC-enacted laws will also regulate the pricing, quality standards, ex-post supervision, project handover and contract dispute resolution.

Second, there should be cleaning up of existing PPP regulations and policies. The regulations of the various authorities should be integrated to form a single PPP project bank and unified implementation guidelines to prevent policy conflicts. All PPP-related sections in existing laws, regulations and department documents should be reconciled and the provisions in laws such as the Government Procurement Law, Bidding Law, and Law on the State-owned Assets of Enterprises that conflict with PPP operations should be cleaned up and amended to provide a strong legal basis for the PPP model.

Leveraging professional persons and organisations. The authorities governing PPP operations often lack people who are familiar with the PPP model and are constrained by limited headcount. Thus, apart from strengthening training of existing staff and capitalising on their competence and capabilities, they should leverage the role of professional intermediaries. The government should work more closely with professional consulting firms to tap the knowledge of independent third-party intermediaries.

A case in point is Japan and South Korea, where professional PPP consulting firms cooperate with accounting firms, law firms, assets valuation firms and engineering consultancies to provide comprehensive PPP services for the relevant authorities. Governments should also encourage full competition among consulting firms and should allow foreign consulting firms to take part in projects that do not involve concerns of confidentiality. To ensure the neutrality of third-party intermediaries for a sound value-for-money analysis, the authorities should ensure that these intermediaries are not overly driven by business or profit considerations but instead provide "value-must-be-for-money" analysis.

Improving systems to control potential risks. First, there should be improvement to the budget management system for PPP project-related expenditure. PPP project-related government payment and viability gap funding should be calculated based on national accounting standards. To control contingent liability risks, such payments should also be included in the annual budget and interim fiscal plan and reported to the local people's congress or its standing committee. Governments should improve control of contingent liability risks arising from earnings or repurchase guarantee and government-issued formal or informal letters of guarantee.

Second, developing basic public service standards and third-party appraisal mechanism is required. In sectors where the PPP model is adopted, basic public services should be unified as soon as possible, user feedback obtained and the quality and efficiency of public services appraised. This is to prevent omission of private investor screening, feasibility studies and standardisation of contract terms as well as irrational risk-sharing when rushing to implement, which would result in exposure to risks in the project's follow-on executions.

Third, an information disclosure should be included. At the central and provincial (municipality and region) levels, a unified PPP information disclosure platform should be developed to facilitate public disclosure of all value-for-money assessment reports for PPP projects as well as their fiscal affordability evaluation reports, bidding information and contracts, and to enable public supervision. This will prevent clandestine operations and tunnelling and improve the quality and efficiency of public services.

Financing Infrastructure and Development *A Sustainable Approach in Singapore*

LOW Sin Leng and Jean CHIA

Introduction: *Pragmatic, sustainable financing*

In the 1960s, Singapore was confronted with a classic development challenge. Singapore had attained self-government led by the People's Action Party (PAP) in 1959 and it became fully independent from the British in 1965. It was in urgent need of urban infrastructure such as public transport, roads, drainage, sewerage and affordable housing. But Singapore had limited ability to finance these. The then 582 sq km island had no natural resources that it could export for revenue, had a small tax base of only 1.6 million people, few industries, and received little direct foreign investment.

Nevertheless, with pragmatic and prudent governance and expenditure policies ever since, Singapore has been able to accumulate surpluses, while continuing to invest in high-value infrastructure. Over the next five decades, Singapore developed extensive and effective urban infrastructure that played a crucial role in the country's success. Today, the city-state of 5.5 million people and a per capita gross domestic product (GDP) of about S$71,000 (US$56,000 in 2014 dollars),[1] is consistently ranked as one of the most liveable and competitive cities in global surveys.

As a city-state, Singapore has a one-tier government. Operational and development expenditures, which include infrastructure and development projects, are financed largely from government operating revenues, which draw from a broad pool of revenues such as direct (including corporate and personal income taxes) and indirect taxes, fees and charges, licences and permits, etc. Unlike some territories, revenues from land sales are generally not used to fund the government's expenditures, and instead accrue to reserves.

Another key feature of the public sector in Singapore is that statutory boards — which are separate legal entities from the Government, set up under special legislation to perform specific functions — play key roles in planning and implementing infrastructure as well as public services in Singapore. Examples of statutory boards include the Housing and Development Board (HDB), Land Transport Authority (LTA), PUB[2] (the national water agency), National Environment Agency (NEA) and Jurong Town Corporation (JTC).

Statutory boards have a greater degree of operational autonomy compared to government ministries and are generally regarded as efficiently run and effective in implementation. Singapore is also regularly ranked as one of the world's least corrupt countries.[3] This allows the Singapore Government to establish an accurate and transparent understanding of the economic costs and returns involved in infrastructure development. Some statutory boards, especially those responsible for economic infrastructure, collect payments for their services and may also be self-financing on a cost-recovery basis.

This chapter identifies the broad principles and approaches that Singapore adheres to for financing infrastructure in a sustainable manner. Briefly, four broad principles are highlighted: Fiscal prudence and self-reliance, working with markets, innovating systematically and executing effectively, and long-term thinking. Examples are drawn from the sectors of public transport, public housing, water supply and solid waste management to illustrate how these financing principles have been applied to specific cases, and have evolved over time.

Fiscal prudence and self-reliance

Fiscal prudence and self-reliance are the central principles that guide Singapore's approach to financing economic and social infrastructure. Shaped by their experience of the British colonial era since the 19th century and the Japanese Occupation during World War II, the pioneering political leaders of an independent Singapore emphasised frugality and self-reliance, often leading by personal example. Mr Lee Kuan Yew, the country's founding Prime Minister, was determined that "our people must never have an aid-dependent mentality. If we were to succeed, we had to depend on ourselves."[4]

[1] Department of Statistics, Singapore. *Time Series on Per Capita GDP at Current Market Prices.*

[2] Established in 1963 as a statutory board, the Public Utilities Board (PUB) was charged with providing water, electricity and piped gas in Singapore. The electricity and gas sectors were progressively deregulated in the late 1990s and PUB was reconstituted in 2001 as Singapore's national water agency, while the Energy Market Authority (EMA) was formed to regulate the electricity and gas markets.

[3] Singapore ranked 7th least corrupt out of 174 countries in Transparency International's 2014 Corruption Perceptions Index.

[4] Lee Kuan Yew. *From Third World to First: The Singapore Story: 1965-2000.* Singapore: Times Media and The Straits Times Press, 2000, p 70.

From the start, Singapore's first Finance Minister, Dr Goh Keng Swee, had inculcated the attitude of "not spending more than one earns." This ethos also permeated through the service. Dr Goh was known to be a hard man to convince when it came to spending requests. An anecdote from Mr Ngiam Tong Dow, a former Permanent Secretary at the Ministry of Finance (MOF), illustrates this well: "Dr Goh told young officers that when a Ministry asked for a budget, however laudable the purpose, the Treasury officer should instinctively look away and say 'no'. He said that the supplicant Ministry would not take 'no' for an answer and would come back a second time. Again, the answer would be a resounding 'no'. He would come back a third time. This time, you approve half of what he wants. You reward him for his tenacity. He goes away feeling grateful and relieved."[5]

But Dr Goh also realised that the MOF had to do much more than play its traditional role as a treasury in order to create jobs and wealth,[6] and so, set up an economic development division early in the MOF as well as the Economic Development Board (EDB). In the immediate years after attaining self-government in 1959, it was not possible for the Government to be completely self-reliant. Instead, it had to borrow from both domestic and external sources to finance development.

Even then, the MOF adopted a fiscally prudent approach from as early as Singapore's first Development Plan, which covered the period between 1961 and 1964. The Plan — worth some S$871 million in 1961 dollars — made recommendations including an acceleration of infrastructure development and improvements to kick-start industrialisation. Importantly, more than half the budget was spent on revenue-generating projects in sectors such as power, water, gas, housing and port development. The underlying logic was that these projects supported economic and social development. In addition, they were expected to be financially self-supporting — through user fees and other revenues — after initial injection of capital.[7] Almost two decades later, the Government would apply the same financing approach to kick-start the development of Singapore's Mass Rapid Transit (MRT) system (see *Box Story 1*).

Apart from fiscal discipline, Singapore also showed early monetary discipline by opting to retain its colonial-era Currency Board system after separation from Malaysia in 1965. Under this system, every dollar issued by the Singapore Government had to be fully backed by foreign exchange reserves. In other words, if Singapore wished to spend more, it would first have to earn more foreign reserves.[8] The automatic convertibility of the Singapore dollar to other currencies, guaranteed both in law and in fact, obligated the Government to balance its budget for both recurrent and capital development projects.

Domestic borrowing: High savings, stable rates

As noted, in the early years of post-colonial development, the Government had to borrow to finance its development expenditure. Singapore's high level of domestic private savings allowed the Government to borrow from domestic sources at relatively stable interest rates to invest in infrastructure development.

One important source of domestic funds was the Post Office Savings Banks (POSB), which was established by the British colonial government and made a statutory board in 1972. POSB functioned as a national savings bank that promoted thrift and mobilised domestic financial resources for national development. It was highly successful and many Singaporeans saved with the POSB. Between 1971 and 1976, deposits grew from S$91 million to S$996 million.[9]

POSB and other public sector entities and commercial banks were mobilised for development when they purchased Singapore Government Securities. These securities were initially issued to meet local banks' need for a risk-free asset in their liquid asset portfolios. In 1977, POSB used S$634 million or 45% of its deposit funds to purchase government securities.[10] This, in turn, provided the Government with financing for various public investments such as on roads, bridges, airports, container ports, power stations, reservoirs and the MRT system.[11]

Over time, POSB's role in financing public infrastructure diminished. It was corporatised (and renamed POSBank) before being acquired by DBS Bank in 1998. Since then, statutory boards have been encouraged to directly tap Singapore's capital markets to meet infrastructure-financing needs. This is in line with the Government's efforts to develop Singapore's

[5] Ngiam, Tong Dow. "Leaders in Building the Singapore Economy". In *A Mandarin in and the Making of Public Policy: Reflections* by Ngiam Tong Dow. Singapore: NUS Press, 2006, p 166.
[6] Ngiam, Tong Dow. "Musing of a Singapore Administrator". In *Dynamics of the Singapore Success Story: Insights* by Ngiam Tong Dow. Singapore: Cengage Learning Asia, 2011, p 11.
[7] Ministry of Finance, Singapore. *State of Singapore Development Plan*, 1961-1964. 1961, p 39.
[8] Singapore Parliamentary Report. *Common Currency and Banking System (Statement by the Minister of Finance*). Parliament No:1, Session No:1, Volume No:25, Sitting No:5, 26 August 1966.
[9] National Archives of Singapore Collection. *POSB – The Need for a People's Bank*.
[10] Lee, Sheng-Yi. *The Monetary and Banking Development of Singapore and Malaysia (Third Edition)*. Singapore: NUS Press, 1990.
[11] Lee Kuan Yew. *From Third World to First: The Singapore Story, 1965-2000*, p 129.

bond market. A few statutory boards have issued bonds denominated in Singapore dollars.

Singapore also has a mandatory savings scheme in the form of the Central Provident Fund (CPF) established under the British colonial government in 1955 to help workers build up retirement savings. Employees and employers contribute a percentage — which has varied over the years — of salaries to employees' individual CPF savings accounts. From about 180,0000 CPF members in 1955, the CPF has grown to encompass all employed citizens and permanent residents, with more than 3.5 million CPF members today.

The CPF has been deployed to significant effect in the financing of public housing in Singapore. To enable CPF members to finance their purchases of public housing, the Government allowed the use of CPF savings to pay housing mortgages in 1968, making home ownership more affordable (see Box Story 5). As home ownership rates soared, CPF has become another pillar of retirement security. As a comprehensive social security savings scheme, the use of CPF savings has been extended to other needs such as healthcare.

The Government no longer borrows to fund its expenditure, including development expenditure. Nevertheless, it issues two types of debt securities — Singapore Government Securities (SGS) and Special Singapore Government Securities (SSGS). SGS are marketable debt instruments issued to help develop Singapore's debt markets, while SSGS are non-tradable bonds issued through Singapore's central bank, the Monetary Authority of Singapore (MAS), to meet the statutory requirements of the Central Provident Fund Board, which administers Singapore's compulsory social security savings scheme. The law forbids the Government from funding its budget through monies raised from the sale of SGS and SSGS. Instead, all proceeds must be invested.

External borrowing: Mainly for development

External debt also played an early, albeit short-lived, role in Singapore's development. Like many other developing countries, Singapore also borrowed from the World Bank and the Asian Development Bank to finance infrastructure such as power stations, sewerage systems, reservoirs, telephone networks, sea ports and airports.[12]

[12] Ministry of Finance, Singapore. *State of Singapore Development Plan, 1961-1964*. 1961, p 39.

The Government's stance on external borrowing was that it would be used mainly for development, not for consumption.[13] The Government also treated borrowing from multilateral development banks as an opportunity for Singapore to establish its credit-worthiness internationally and signal the value of Singapore's development projects. As Mr Lim Siong Guan, a former Permanent Secretary of the MOF, explained, borrowing "was about establishing that the World Bank has found this project that we are trying to do in Singapore worthy of support... it was... credit enhancing. It wasn't [about] money. It was about trying to establish the standards."[14]

Backed by Britain and Malaysia, Singapore obtained its first loan of US$15 million in May 1963 to construct the first phase of the Pasir Panjang 'B' Power Station. After separation from Malaysia in 1965, Singapore had to join the World Bank as a member in order to qualify for loans. While the membership subscription rate of US$32 million — of which Singapore had to pay 10 per cent[15]— was considered relatively high, it was deemed a necessary expenditure. Singapore formally took up membership in the World Bank and International Monetary Fund (IMF) in August 1966.[16]

The World Bank gave Singapore a loan of US$6.8 million (S$20.5 million in 1965 dollars) for the Johor River Water Project in 1965 to develop freshwater supplies[17] and another loan of US$23 million in 1967 to expand the power transmission and distribution systems as well as water supply facilities. The World Bank praised Singapore for being a "good debtor". It also noted that the Singapore Government "has done as much as a government can to create a favourable investment climate."[18] Up until 1970, Singapore had received eight loans amounting to US$92.4 million from the World Bank for various projects.[19] Singapore's port, electricity supply and distribution, sewerage development as well as telephone network all benefited from the financial support of the World Bank.

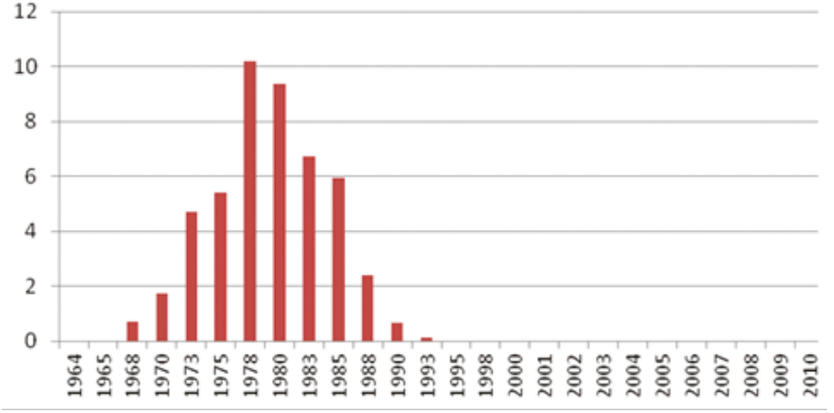
The Development Bank of Singapore (DBS) was the first company in Singapore to obtain a loan from the Asian Development Bank (ADB) in 1969. The 14-year loan worth US$10 million was used to finance private sector manufacturing and service firms. The ADB would go on to provide another

[13] Ngiam, Tong Dow. "Land and Infrastructure". In *A Mandarin in and the Making of Public Policy: Reflections* by Ngiam Tong Dow. Singapore: NUS Press, 2006, p 100.
[14] Lim, Siong Guan. *Interview with Centre for Liveable Cities* (unpublished transcript), 26 November 2012.
[15] Singapore Parliamentary Reports (Hansard). *Bretton Woods Agreements Bill*. Parliament No:9, Session No:2, Volume No:72, Sitting No:2, 9 May 2000.
[16] National Library Singapore – Infopedia. Singapore joins IMF and World Bank.
[17] "Singapore gets World Bank loan for water project", *The Straits Times*, 3 March 1965, p 9.
[18] "US $23m loan —and pat on back...", *The Straits Times*, 7 July 1967, p 7.
[19] National Library Singapore - Infopedia. Singapore joins IMF and World Bank.

US$10 million loan to DBS in 1973. The ADB also financed about half the cost of a S$51 million three-year reclamation project in Kranji undertaken by PUB in 1972 to establish a freshwater reservoir storage system.[20] It was also ADB's first loan to involve a private commercial bank, the Bank of America, which co-financed US$5 million. This co-financing scheme was seen as a vote of confidence for the Singapore Government's creditworthiness.[21] By 1974, the ADB had extended US$104 million in loans to Singapore for 10 projects, including the expansion of maritime ports and warehousing facilities, as well as a technical study for a central area expressway[22] .

Other external sources of development loans included the Commonwealth Development Corporation (CDC) which provided a loan of £4 million in 1973 (S$25 million in 1973 dollars) to finance about one-third the cost of PUB's Upper Pierce Reservoir and ancillary water treatment plant.[23]

Singapore's public external debt reached just over S$1 billion in 1978. But the need for external financing to fund development expenditure diminished as Singapore's fiscal situation improved. As a result, public external debt declined to S$68 million in 1990 and S$5 million in 1994. Singapore has not carried any public external debt since 1995.[24]



Singapore Government external debt

Source: Department of Statistics, Singapore. Yearbook of Statistics, various years.

[20] "Singapore's new $51 m reservoir to be built at Kranji". *The Straits Times*, 29 December 1970, p 3.
[21] "ADB loan to the PUB heralds co-financing era in Asian countries". *The Straits Times*, 5 August 1976, p 15.
[22] "Loans by ADB at new high". *The Straits Times*, 13 February 1974, p 9.
[23] "CDC loan for water scheme raised by £1m". *The Straits Times*, 11 August 1973, p 8.
[24] Department of Statistics, Singapore. *Information Paper on Economic Statistics – Singapore's External Debt: Definition and 1998 Assessment*. January 2000.

A steady revenue base

Equally important was the need to ensure that government revenues were sufficient and sustainable in the long run because, as Prime Minister Lee Hsien Loong said in a Parliament Budget speech in 2005, "every dollar which the Government spends has first to be earned."[25] In 1960s and 1970s, the push for industrialisation to drive economic growth was bearing fruit. The economy was expanding with annual gross domestic product (GDP) growth averaging 10 per cent between 1965 and 1978.[26] The Government could rely on a growing economy to generate sufficient government revenues to meet rising expenditures, without having to resort to extensive deficit financing.

In particular, corporate and personal income taxes contribute about a third of government operating revenue today. Singapore has a progressive income tax system, where typically about 80% of income tax is paid by the top 20% of the highest income tax-payers. However, one challenge the Government had was maintaining an internationally competitive tax structure, while raising sufficient revenue.

Over the years, the structure of the Government's operating revenues has adapted to circumstances by moving from taxing income to taxing consumption.[27] In 1994, the Government introduced the Goods and Services Tax (GST), to improve economic competitiveness and reduce reliance on income tax revenues. The GST has been raised progressively to reach its current rate of 7%. About half of government operating revenue today is generated by the GST, corporate and personal income taxes. Other sources of operating revenues include motor vehicle taxes, vehicle quota premiums,[28] betting taxes, stamp duty, customs and excise taxes.

Singapore has enjoyed budget surpluses in most years since 1988, only running relatively small budget deficits in some years when the global economic environment was particularly difficult.[29]

[25] Lee, Hsien Loong. *Budget Speech for 2005*. Ministry of Finance, Singapore, 18 February 2005.
[26] Ministry of Trade and Industry, Singapore. *MTI Insights, Economic History and Milestones, 1965-1978*. https://www.mti.gov.sg/MTIInsights/Pages/1965-%E2%80%93-1978.aspx (accessed 5 October 2015)
[27] Lee Kuan Yew. *From Third World to First: The Singapore Story, 1965-2000*, p 129.
[28] Vehicle Premium Quota is the premium paid to the government for a 10-year Certificate of Entitlement (COE) to register new vehicles in Singapore, based on a vehicle quota and opening bidding system.
[29] For example, in FY2008 and FY2009, the government incurred budget deficits of 0.8 per cent ($2.2 billion) and 1.1 per cent ($2.9 billion) of GDP respectively, as various stimulus packages were rolled out to counter the global financial crisis which was preceded by the subprime crisis in the US.

Box Story 1: **Balancing economic costs and public benefits for the MRT**

"If an all-bus system is just as good as MRT, why have MRT if you have got to subsidise it?" former Deputy PM Goh Keng Swee asked.[30] He was weighing the benefits of developing a rail system against its initial cost of S$5.3 billion.[31] In 1982, that amounted to more than 15% of Singapore's GDP.[32] Naturally, Dr Goh had to be convinced that a rail system was superior to other alternatives, such as an all-bus system. [33]

In May 1982, after almost 15 years of debate and 10 feasibility studies, the Government decided to proceed with the MRT project.[34] By then, there was a compelling case for a rail system. It was the most practical way to move large volumes of people to Marina South, a plot of reclaimed land adjacent to Singapore's Central Business District intended as an extension of the CBD.[35] At the time, the road network to Marina South could neither support large volumes of people nor could it be expanded due to land constraints.

Apart from a practical case, there was also an economic case. The rail system had the potential to raise land values in Marina South. The capital expenditure for the MRT system was drawn from the Government's development fund.

Initially, there was only one rail operator — Singapore MRT Limited (later renamed SMRT Corp). Today, there are two publicly-listed rail operators — SMRT Corp and SBS Transit — running Singapore's 178 km rail network.[36]

[30] Centre for Liveable Cities (CLC) and Land Transport Authority (LTA). *Transport: Overcoming Constraints, Sustaining Mobility*. Singapore: Cengage, 2012, p 12.
[31] Centre for Liveable Cities (CLC). *Financing a City: Developing Foundations for Sustainable Growth, 2014*. http://www.clc.gov.sg/documents/uss/USS_Financing_a_city.pdf
[32] Department of Statistics (DOS), Singapore. Annual GDP at 2010 Market Prices and Real Economic Growth. http://www.singstat.gov.sg/statistics/browse-by-theme/national-accounts (accessed on [30] September 2015); DOS, Annual GDP Deflators. http://www.singstat.gov.sg/statistics/browse-by-theme/national-accounts (accessed on 30 September 2015).
[33] CLC, 2014.
[34] CLC and LTA, 2012, p 13.
[35] Ibid.
[36] Land Transport Authority (LTA). MRT & LRT Trains. http://www.lta.gov.sg/content/ltaweb/en/public-transport/mrt-and-lrt-trains.html (accessed on 30 September 2015).

Financing the subway system

From the start, the challenge for policy-makers has been to balance the public benefit — in the form of affordable fares and a high-quality rail system — against the cost to government.[37] Singapore adopted the approach of shared responsibility. When the MRT system was first developed, the government paid for infrastructure and operating assets. The rail operator, Singapore MRT Ltd, and commuters were responsible for paying for operating costs and asset replacement through fare and non-fare revenues. In other words, the MRT system was expected to be self-sustaining after the initial investment by the Government.

To ensure that this framework of shared responsibility worked, the Government took a cautious approach when approving new rail lines.[38] The Land Transport Authority (LTA) would assess the financial viability of each proposed rail line by comparing the expected operating and replacement costs against fare revenues. Once a decision had been made to build a rail line, the Government discontinued bus services that ran parallel to the MRT route. This minimised duplication as well as competition, ensuring that both rail and bus operators could serve sufficient commuters to cover their operating costs.

Over time, the rail financing model has evolved as the Government responded to changing circumstances. First, the Government has taken on a larger share of rail financing. In 1996, for example, the Government announced that it would co-finance the cost of asset replacement.[39] Commuters and rail operators would pay for the historical cost of operating assets, with the Government paying the balance. This ensured that the rail network could recover operating costs as well as be expanded and replaced without drastically increasing fares.[40]

[37] See, for example, LTA, White Paper: A world class land transport system, 1996, https://www.lta.gov.sg/content/dam/ltaweb/corp/PublicationsResearch/files/ReportNewsletter/White-Paper.pdf
[38] CLC, 2014.
[39] LTA, 1996.
[40] LTA, 1996; LTA, LTA Masterplan: A people-centred land transport system, 2008, https://www.lta.gov.sg/content/dam/ltaweb/corp/PublicationsResearch/files/ReportNewsletter/LTMP-Report.pdf

Chinatown MRT Station. An MRT station on the North-East line, Chinatown Station has become an integral stop since 2013.
*Source: Khalzuri Yazid (FlickrCC)**

This change in policy also lowered the hurdle for new rail projects. LTA could approve new lines as long as operators could fully recover operating costs (including the historical cost of assets) from fare and non-fare revenues. The result: Rail lines that once were a borderline economic case, such as the North-East Line, became viable. It was built at a cost of S$4.6 billion.[41]

The second change has been the shift towards a network approach, instead of a line approach, when evaluating the viability of new rail lines.[42] Since 2010, a rail line that is not financially viable on its own might still be approved if it generates sufficient network benefits, such as an increase in ridership for the existing lines. This approach allowed the Government to bring forward the development of new lines, such as the Downtown Line, which is being developed at a cost of S$12 billion.

Another significant change has been the steps taken to increase the contestability of the rail system.[43] From 2010, the licence period for new rail licences (such as the one for the Downtown Line) has been shortened from a maximum of 40 years to just 15 years. LTA would retain the ownership of operating assets on top of the rail infrastructure and pay for the upgrading and replacement of operating assets. These assets would then be leased to rail operators. This approach offers several benefits. It enables LTA to replace operators after the 15-year licence period. It also allows LTA to take an integrated, long-term approach to expanding the rail network and increasing the capacity of the existing network.

[41] CLC, 2014.
[42] LTA, LTA Appoints SBS Transit Limited to Operate Downtown Line under New Rail Financing Framework. 29 August 2011, http://www.lta.gov.sg/apps/news/page.aspx?c=2&id=659z82u5jocnrr4j4it759812yw2etknbsr66ucn2jd67avxjm (accessed on 30 September 2015).
[43] Ibid.

Working with markets

Unlike the governments of most newly independent countries, the Singapore Government did not adopt an adversarial attitude towards capitalism, markets or private profit. Instead, the Government embraced market thinking and the private sector. In the realm of infrastructure financing, market principles were used to price public utilities and services, create incentives and shape consumer behaviour. From the late 1980s onwards, the Government also made a strong push to involve the private sector in the development, management and operation of infrastructure.

Pricing for cost recovery and co-payment

Many public utilities and services in Singapore continue to be delivered through autonomous public sector agencies or statutory boards. Partial co-payment by the users of public services, such as healthcare, discourages excessive and unnecessary consumption. To maintain financial discipline, market pricing is generally used where there are existing markets. Some of them, like Singapore's national water agency PUB, are self-financing because they recover their operating costs through fees and charges (see *Box Story 2*).

The MOF is responsible for the guidelines related to setting government fees and charges. The fee-setting framework has three key principles. The first principle is "the user pays", which means that costs should be fully recovered from users and cross-subsidies should be avoided. Direct costs such as labour, materials and other operating costs, and indirect costs such as utilities, rental, supporting services and cost of capital may be considered in determining the full cost of a particular good or service. Exceptions are made in cases where fees are set higher than cost to discourage usage, or where fees are set below cost to subsidise a merit good or service, such as education.

The second principle is "the Yellow Pages rule", which means that the public sector should assess the necessity of providing goods and services that are already provided by the private sector, and these would all be usually listed in the business phone directory called the Yellow Pages.

Finally, the third principle is to "keep pace with cost changes", which means that fees and charges should be adjusted in line with cost changes, even as service providers strive to keep costs as low as possible. Nevertheless, when necessary, the Government has frozen or capped increases in fees and charges. This happened between 2007 and 2009, due to the then economic downturn and also an increase in the GST rate at that time from 5% to 7%.

Box Story 2: **Pricing water right**

Despite being surrounded by water as an island, and having an abundance of annual rainfall, Singapore is one of the world's most water-stressed countries. Much of Singapore's water supply has historically been imported from neighbouring Malaysia and water rationing was a common occurrence in earlier years. In 1963, the Public Utilities Board (PUB) was set up as a statutory board to take on the responsibilities of providing water, electricity and piped gas. When the sewerage and drainage departments of the Ministry of the Environment (ENV) were merged with PUB in 2001, PUB became the national water agency responsible for the entire water system in Singapore.[44]

To build up self-sufficiency in water, PUB invested heavily in expanding Singapore's water infrastructure and resources. To support the investments by PUB and to promote water conservation, a series of increases in water tariff were implemented from 1966 to the mid-1980s. In 1973, the flat-rate water tariff was also replaced with a four-tier domestic water tariff system, with higher rates for high-volume consumers, to further discourage over-consumption.

Currently, the water pricing formula consists of a Water Tariff (that accrues to PUB to fund the cost of water production and distribution) Water Conservation Tax (to encourage water conservation and accrues to government revenue) and Waterborne Fee and Sanitary Appliance Fee (to offset the cost of treating used water, that is, sewage, and for operating and maintaining the used water network).

The water price is set at a level that allows for recovery of the full costs of operating the entire water infrastructure, such as the costs incurred in rainwater collection, reservoir management, water treatment and water distribution networks. It included the higher

[44] At the same time, PUB's regulatory functions for electricity and gas were transferred to the newly set up Energy Market Authority (EMA).

NEWater Plant. The pricing of water included the high cost of NEWater and non-conventional water sources.

Source: Singapore's National Water Agency–Public Utilities Board

costs of non-conventional water sources, namely desalination and NEWater (reclaimed water) production when these became viable for Singapore. The costs of operating and maintaining public sewers and used water treatment are also included. This pricing model for water has enabled PUB to largely self-finance its operating costs and part of its capital expenditures.

The pricing of water also reflects its scarcity. The total price of drinking water — comprising the Water Tariff and Water Conservation Tax — is pegged to the marginal cost of producing the "next drop" of water after all the rainwater collected has been used, i.e. the cost of desalination and NEWater production.

The cost-recovery approach is also tempered with social and public good considerations. To offset the GST incurred by lower- and middle-income households, the Government provides rebates off household utilities bills in the form of the GST Voucher–U–Save. When PUB took over the collection and treatment of used water (sewerage) in 2001, the Government decided not to increase used water fees to cover the capital expenditure of the used water (sewerage) network. As the used water network served as a public good, its capital expenditure was funded through government grants from general tax revenues instead. On the other hand, the operating and maintenance costs of treating used water is funded through the Waterborne Fee and Sanitary Appliance Fee collected by PUB.

Corporatisation and privatisation

In the 1990s, the public sector went through a wave of corporatisation and privatisation (see *Table 1*). Unlike the waves of privatisation that had occurred elsewhere, Singapore's was not intended to raise revenue for the Government. Instead, the Government had three objectives. First, it wanted to withdraw from commercial activities that it believed the public sector no longer needed to undertake. Second, privatisation was seen as a means to broaden and deepen Singapore's stock market. Third, privatisation was seen as a means to keep costs low; the assumption was that profit-maximising private sector companies had a greater incentive to be efficient.

Some corporatised entities retain substantial government ownership. Since then, the pace has slowed, as the bulk of such activities have been completed, and the Government has taken a more cautious approach to further privatisation.

Table 1: Waves of corporatisation in Singapore

Year	*Public sector organisation*	*Resultant entities*
1994	**Telecommunication Authority of Singapore (TAS)**	— SingTel (listed in 1993) — Singapore Post — TAS* remained as the regulator.
1995	**Public Utilities Board (PUB)**	— The electricity and gas components of PUB were corporatised in 1995 into three market segments, i.e., generation (contestable), transmission (non-contestable) and distribution (non-contestable). — Singapore Power (wholly-owned by Temasek Holdings) was created in 1995 as a holding company for newly-set up power generation companies. — Energy Market Authority was created in 2001 to regulate the electricity and gas markets. — PUB was reconstituted in 2001 to become a comprehensive water agency.
1997	**The Port of Singapore Authority (PSA)**	— PSA Corporation Limited (wholly-owned by Temasek Holdings) — Maritime and Port Authority was set up in 1996 to develop and regulate the port and maritime activities.
1999	**The Public Works Department (PWD)**	— Portions of PWD were corporatised in 1999 under Temasek Holdings. The corporatised entity was renamed CPG Corporation in 2002 before being sold through public tender. — The regulatory functions were merged into other statutory boards, such as the Building and Construction Authority, Land Transport Authority and National Parks Board.

*Note: TAS was merged with National Computer Board to form Infocomm Development Agency (IDA) on 1 December 1999.

Public–Private Partnerships for efficiency

Public–Private Partnerships (PPPs) are another way in which the Government reaped efficiency gains, unlike many other authorities that turn to PPPs when public budgets fall short. The MOF formally introduced PPP as a mode of procurement under its Best Sourcing framework in 2004.

Traditionally, a public sector agency would contract private sector companies to construct facilities and supply equipment to provide public services. This entailed making a lumpy investment upfront, subsequently owning the facilities or equipment and remaining responsible for the actual delivery of services.

With a PPP, the public sector focuses on acquiring services at the most cost-effective basis, rather than on directly investing in, owning, maintaining and operating assets. The private sector organisation typically takes on financing, design, construction and operation risks in the project, while the public sector agency typically manages the political and regulatory risks.

Public sector agencies in Singapore are encouraged to work with the private sector to deliver non-core services, particularly those that require the development of new physical assets. Nevertheless, most public sector

agencies continue to rely on direct contracting instead of on PPP. This is because most agencies have largely been able to achieve satisfactory results through direct contracting.[45] So far, only eight PPP contracts have been awarded (see *Table 2* and *Box Story 3*).

The physical development of Singapore has also benefited from the participation of the private sector, particularly through the Government Land Sales (GLS) programme. Through this programme, state lands are released for sale to the private sector on a stipulated lease term for various developments. The private sector brings its risk-taking capacity, financial resources and sector expertise, while the government agency sets the overall planning parameters aligned with national objectives, and provides the land and basic infrastructure. A prime example of the public and private collaboration through the GLS was the development of the Golden Shoe district (see *Box Story 4*).

Table 2: PPP projects in Singapore

No.	*PPP project*	*Resultant entities*
1	**Singapore Sports Hub (Singapore Sports Council / Singapore Sports Hub Consortium)**	— PPP deal with a 35 ha site to replace the National Stadium for 25 years. — Officially opened in July 2015
2	**ITE College West (Institute of Technical Education / Gammon Capital)**	— Contract to design, build, maintain and operate the education facility for 27 years. — Officially opened in July 2010
3	**SingSpring Desalination Plant (Public Utilities Board / SingSpring (Pte) Ltd)**	— Supply 136,000 cubic metres (30 million gallons) of water per day for 20 years from 2005 to 2025. — Officially opened in September 2005
4	**Tuaspring Desalination Plant (Public Utilities Board / Tuaspring Pte Ltd)**	— Supply 318,500 cubic metres (70 million gallons) of water per day for 25 years from 2013 to 2038. — Officially opened in September 2013.
5	**Keppel Seghers Ulu Pandan NEWater Plant (Public Utilities Board/ Keppel Seghers NEWater Dev (Pte) Ltd)**	— Supply 148,000 cubic metres (32 million gallon) of NEWater per day for 20 years from 2007 to 2027. — Officially opened in March 2007
6	**Sembcorp NEWater Plant (Public Utilities Board / Sembcorp NEWater Pte Ltd)**	— Supply 228,000 cubic metres (50 million gallons) of NEWater per day for 25 years from 2010 to 2035. — Officially opened in May 2010.
7	**Incineration Plant (National Environment Agency / Keppel Seghers Engineering Singapore Pte Ltd)**	— Design, build, own and operate a new incineration plant next to the Tuas South Incineration Plant to incinerate 800 tonnes of refuse per day for 25 years from 2009 to 2034. — In operation since January 2009
8	**TradeXchange (Singapore Customs / CrimsonLogic Pte Ltd)**	— Contract to create a one-stop integrated logistics information port: Develop the software, including the maintenance and operation of the system for 10 years from 2007 to 2017

Source: Ministry of Finance, Singapore. Public Private Partnership.

Box Story 3: **Working with markets for efficient waste management**

In the 1960s and 1970s, solid waste collection in Singapore was a manual, irregular and inefficient process. But a series of infrastructure, institutional and regulatory systems transformed solid waste collection into a reliable and efficient service provided by the public sector. Measures such as the consolidation of waste collection fees with utility fees, and building rubbish chutes and waste collection systems in high-rise residential apartments as well as industrial and commercial buildings have paid off. This was achieved despite the amount of solid waste increasing from 1,260 tonnes per day in 1970 to 8,338 tonnes per day in 2014.[46]

[45] Gunawansa, Asanga. "Is There a Need for Public Private Partnership Projects in Singapore?" In *Proceedings of Construction, Building and Real Estate Research Conference of the Royal Institution of Chartered Surveyors*, Paris, 2-3 September 2010, p 20.

[46] National Environment Agency (NEA). *Waste Management*. http://www.nea.gov.sg/energy-waste/waste-management/overview (accessed 30 September 2015).

By the 1990s, the Government had shifted its focus towards privatising non-core public services such as waste collection. The thinking at the time was that market discipline could bring about even more efficiency gains, thereby keeping costs low for Singaporeans. The Ministry of the Environment (ENV) took a gradual two-step approach to privatising waste collection. It first corporatised its waste collection arm in 1996. The corporatised entity was given rights to be the sole provider of waste collection services in Singapore for three years. After ascertaining that service quality could be maintained without any undue increase in waste collection fees, ENV proceeded with the next phase.

In the next phase, Singapore was divided into nine geographical sectors, each with about 100,000 households and trade premises. The waste collection rights for each sector were put up for competitive tendering by pre-qualified waste collection companies. Successful tenderers, including both local and foreign waste collection companies, were appointed as public waste collectors for the respective sectors. Through a series of measures — including putting in place regulatory and licensing conditions, as well as having a transparent fee structure — the privatisation of Singapore's domestic waste collection services has resulted in efficiency improvement in service provision, and a lower average waste collection fee. A second round of tender for waste collection licences was conducted between 2004 and 2006.

To develop a more robust, sustainable and affordable waste collection system in Singapore, the nine sectors for waste collection were consolidated into six sectors in 2012 to derive more cost savings from economies of scale. A uniform fee system was also introduced in 2015 to unify the disparate fee structures of different sectors. Other measures are being implemented to help the industry realise efficiency gains, mitigate rising costs in labour and fuel and raise standards and productivity while leveraging technology and innovation.

Partnerships for solid waste disposal

Before the 1970s, solid waste was directly disposed of in landfills, but this was not a sustainable solution for land-scarce Singapore. Incineration, which substantially reduces the volume of solid waste, was identified to be a viable solution. In 1973, Singapore started to build its first waste-to-energy (WTE) incineration plant at Ulu Pandan at a cost of S$94 million, with a US$25 million loan from the World Bank. Over the next 30 years, the Government would develop, own and operate three more WTE plans in Tuas (1986), Senoko (1992) and Tuas South (2000).

By 2001, the Government was looking into injecting private sector participation to increase operational efficiency and develop the environmental engineering industry. This was initiated through

Keppel Seghers Tuas WTE Plant. Keppel Seghers Engineering Pte Ltd was awarded the tender to build and operate the WTE Plant through the DBOO scheme in 2004.
Source: Keppel Seghers Waste-to-Energy Plant

the Government's decision to plan and build the fifth WTE plant in Singapore through a Design, Build, Own and Operate (DBOO) model.

However, the first open tender for the fifth WTE plant in 2001 — where the private operator had to take on the plant's financial, design and demand risks — received only one bid which was non-compliant. Learning from the episode, the Government assessed that potential bidders felt that they would be unable to bear the demand risk associated with uncertain waste growth and a non-guaranteed waste stream, given that they already had to bear a high initial capital cost.

In 2004, a DBOO scheme — this time with a full "take-or-pay" approach — was tendered out again and it received a better response from the market. Under this approach, the Government would bear the demand risk by entering into a "take-or-pay" agreement with the private operator to purchase the full incineration capacity at a pre-agreed price set through the tender. In return, the DBOO operation would bear the operational risk and would be required to meet performance indicators on the quality of the incineration process and service quality level to waste collectors. Eventually, Keppel Seghers Engineering Pte Ltd was awarded the tender to build and operate the WTE plant for 25 years. Keppel Seghers Tuas WTE plant started operations in 2009. During that year, the Ulu Pandan Incineration Plant was decommissioned after having been in operation for the past 30 years.

Box Story 4: **Public-private collaboration through Government Land Sales**

The Government Land Sales (GLS) programme — where state lands are released regularly for sale on a stipulated lease term through tenders and auctions to the private sector for various uses — has become a key instrument for development since it was launched in the 1960s. Experts from the United Nations Development Programme (UNDP) who were advising a newly independent Singapore in the early 1960s had recommended that large-scale urban renewal needed the participation of the private sector through the sale of development sites, with the guidance of the Government.

In Singapore, the Singapore Land Authority (SLA), a statutory board under the Ministry of Law, oversees the GLS programme on behalf of the State, while relevant agencies such as Urban Redevelopment Authority (URA), HDB and JTC act as the State's land sales agents to manage the sales of specific sites. The tender conditions lay out the terms and conditions of the land sale, including the planning parameters and urban design requirements, which are aligned to the Government's development objectives.

The GLS programme has been used to great effect in the urban renewal programmes in the Central Area to support economic development. For example, the second Sale of Sites launched by URA in 1968 focused on revitalising the commercial heart of Singapore around Raffles Place and Shenton Way through the sale of 14 sites for new commercial and office developments. At the time, the area comprised densely packed, but mostly low-rise, commercial and retail establishments, run-down shophouses, as well as warehouses and jetties along the waterfront. The area earmarked for redevelopment was later dubbed the "Golden Shoe" district for its resemblance to an upturned shoe.

Given the fragmented private land ownership in the area, some land-owners initiated projects involving the amalgamation and redevelopment of individual land plots, to avoid compulsory land acquisition by the Government. Redevelopment plans had to be submitted to the URA for approval. The Government continued to spur private investments in the Golden Shoe area through subsequent sales of sites in the late 1970s and early 1980s, including acquiring and amalgamating smaller land parcels where it was deemed necessary, which were then cleared, re-parcelled and tendered out to private developers. A number of landmark buildings were constructed during this period, including DBS Building (1975), OCBC Building (1976), Monetary Authority of Singapore Building (1985), and Standard Chartered Bank Building (1986).[47]

[47] Centre for Liveable Cities (CLC) and Civil Service College (CSC). Liveable and Sustainable Cities – A Framework, 2014. http://www.clc.gov.sg/documents/books/CLC_CSC_Liveable_&_Sustainable_Cities.pdf.

Golden Shoe District before *(left)* and after *(bottom)* redevelopment.

Source: Urban Redevelopment Authority, all rights reserved

To encourage the private sector's participation in development, especially in the early years, incentives were offered to developers, such as special property tax concessions and waiver of development charges.[48] Successful bidders could also pay for the land in instalments over periods of up to 10 years. Such incentives were scaled back as the industry and development matured. Relevant legislations were also reviewed so that they would support redevelopment efforts. For example, rent control — which was enacted in the post-war years to ease housing shortages and prevent landlords from profiteering — had the negative side-effect of discouraging renovation and redevelopment. To counter this, the Government progressively phased out rent control starting with the Golden Shoe area in 1969, while carefully managing the negative fallout on affected tenants.

[48] Development charge is a tax that is levied when planning permission is granted to carry out development projects that increase the value of the land.

Systematic innovation, effective execution

The Government has innovated in a variety of ways and demonstrated its ability to execute effectively throughout the development process. In the 1960s, the overarching priority was to mobilise resources for development. To this end, the Government implemented highly innovative land acquisition policies. In addition, the Government also enabled citizens to use their retirement savings to purchase public housing flats, thereby transforming Singapore into a property-owning democracy.

At an operational level, the MOF has also addressed the rising cost and complexity of public sector infrastructure projects by assembling experts to help evaluate these projects.

Managing land acquisition

One of the key obstacles to development is land acquisition. Owners may be unwilling to sell or may demand high compensation. The Government's land acquisition policy has been crucial in keeping the development of public infrastructure affordable.

Through the Land Acquisition Act of 1966, the Government was empowered to acquire land for public uses such as public housing, industrial estates, port development and educational institutions (see *Box Story 5*). Once the Government deemed that a land parcel was required for public use, its decision was final and could not be reversed by any other authority.

Two principles guided the Government's approach to land acquisition, particularly in the early years of development.[49] First, no private landowner should benefit from development which had taken place at public expense. Second, the price paid on the acquisition should exclude any potential increase in land value arising from development contemplated by the Government in the area.

Since then, the Act has been amended several times to change the basis for compensation. In 1973, against the background of land speculation,

[49] Singapore Parliamentary Reports. *Land Acquisition (Amendment No. 2)* Bill, First Reading. Parliament No:0, Session No:1, Volume No:23, Sitting No:1, 10 June 1964.

the Act was amended to fix compensation at the market value prevailing on 30 November 1973 or on the date of gazette notification, whichever was lower. Although the statutory date for pegging compensation has been updated several times, it was only in 2007 that the Act was amended to allow compensation for subsequent acquisitions to be based on prevailing market rates. By then, the divergence between the compensation provisions in the law and the actual market price of land had become a source of contention with landowners,[50] and the Government sought to bridge that gap through ex-gratia payments.

Another landmark legislation was the amendment made to the Foreshores Act in 1964. At the time, the Government had embarked on land reclamation along the coast of Singapore. The Foreshores Act was amended to prevent landowners from seeking compensation on account of the loss of sea frontage. Mr Lee Kuan Yew recalled that "the market was at an all-time low at that time and large tracts of land... were lying fallow by investors who were waiting for the climate to change (so that) they (could) manipulate and sell it at a big price. We just acquired as many large pieces of land as possible and claimed the right to reclaim coastal areas."[51] To be sure, very few governments are electorally strong enough to implement such a land acquisition legislation.[52] The Singapore Government was able to do so in the 1960s partly because there were relatively few large landowners.

There are strict controls within the Government to ensure that all acquisitions are for a public purpose. The ministry proposing the land acquisition has to seek the concurrence of the Ministry of Law, which has to endorse that the proposed acquisition is clearly for a public purpose. Only then can the proposal be tabled to Cabinet for a decision. Landowners who are dissatisfied with the compensation can appeal to the Appeals Board.

Box Story 5: **Effective use of resources for affordable housing**

Singapore is widely recognised for its successful public housing system. Today, about 80.4% of citizens and permanent residents live in public housing flats.[53] About 90% of these residents own the flats they live in.[54]

At its heart, Singapore's public housing story is about the effective mobilisation of resources. In the early years, this enabled the Government to build a large number of low-cost units predominantly for ownership and also for rent. It also enabled the Government to ensure that the working population had the financial ability to pay for housing, thereby assuring the sustainability of the public housing programme.

Keeping development and building costs low

The Land Acquisition Act was perhaps the most important policy that kept the development cost of public housing low. In the early days, it enabled the Government to acquire land at affordable rates. But Singapore's Housing and Development Board (HDB) also undertook significant initiatives to keep costs low. Under the leadership of Mr Lim Kim San, its first Chairman, the HDB sought to put an end to the uncompetitive and rogue practices of the construction industry.[55] One strategy for improving competitiveness was to open up the tendering process for public housing projects to all construction companies with the ability and track record. This put an end to the earlier system, which allowed only a few registered contractors to tender for public housing projects.

The HDB also took stern action against rogue practices.[56] One contractor was made to rebuild a whole block of flats in Margaret Drive because it was crooked. Building material suppliers were also warned

[50] Singapore Parliamentary Reports. *Land Acquisition (Amendment)* Bill. Parliament No:11, Session No:1, Volume No:83, Sitting No:3, 11 April 2007.
[51] Lee, Kuan Yew. Interview with *Centre for Liveable Cities (unpublished transcript)*, 31 August 2012.
[52] Ngiam, Tong Dow. "Success and Failure of Public Policies: The Singapore Experience, 1960-2000". In *A Mandarin in and the Making of Public Policy: Reflections by Ngiam Tong Dow*. Singapore: NUS Press, 2006, p 152–153.

[53] DOS, *Latest Data,* 29 September 2015, http://www.singstat.gov.sg/statistics/latest-data#20 (accessed on 30 September 2015).
[54] Housing and Development Board (HDB). *Public Housing in Singapore*, 6 September 2014, http://www.hdb.gov.sg/fi10/fi10320p.nsf/w/AboutUsPublicHousing?OpenDocument (accessed on 30 September 2015).
[55] CLC, 2014.
[56] Ibid.

against profiteering or collusion. When warnings failed, the HDB developed its own sand and granite quarries to stabilise the market. When this happened, the suppliers returned to the negotiating table. As Mr Lim Kim San recounted: "They came to us and said, 'Look, how much do you require for housing? We will supply to you at the same rate. The balance, if you don't mind, if private developers want, we sell at another price'." [57]

Another cost-reducing measure was the adoption of innovative technologies to reduce the cost of production. In 1981, the HDB pioneered the pre-fabrication method of construction in Singapore. It entered an almost S$500 million agreement with two companies — one Australian and the other French — to build 30,000 pre-fabricated three- and four-room flats at Bukit Batok, Jurong West, Tampines, Teck Whye and Yishun.[58]

Mobilising domestic resources for housing finance

When the Home Ownership for the People Scheme was launched in 1964, it met with limited success. The intended beneficiaries of the scheme — low- and middle-income families — could not afford the cash downpayment set at S$900 for two-room flats, and S$1,200 for three-room flats.[59] Consequently, between 1964 and 1967, less than 2,000 public housing units were sold each year.[60]

The masterstroke was mobilising Central Provident Fund (CPF) retirement savings for housing finance. Since 1955, employers and employees have had to contribute a small percentage of salaries to CPF. In 1968, the Government enabled the people to use these savings to service their mortgage loans for public housing flats through the CPF Public Housing Scheme.

[57] Ramon Magsaysay Award Foundation, Lim Kim San: Biography, August 1965, http://www.rmaf.org.ph/newrmaf/main/awardees/awardee/biography/65 (accessed on 30 September 2015).
[58] HDB, "Signing ceremony for award of contracts to build 30,000 HDB apartments using industrialised method of construction," 11 January 1982, http://www.nas.gov.sg/archivesonline/data/pdfdoc/HDB19820111.pdf (accessed on 30 September 2015).
[59] "Own a flat – for $900 down," *Straits Times*, 12 February 1964.
[60] CLC, 2014.

This policy, as then Labour Minister S. Rajaratnam described it, was "an exercise in social innovation and social transformation, an attempt to create as large a proportion of property-owning population as possible so that they would have a deep and abiding stake in the country, and thereby revolutionise the pattern of living of our people for the better."[61] In 1968, the HDB received 8,455 applications for flat purchases.[62] By the 1970s, the preferred choice of tenure was owner-occupation, not rental.[63]

The CPF Housing Scheme is complemented by other financing policies such as concessionary mortgage loans and housing grants which are tipped in favour of low-income families. There are also safeguards to ensure that people do not spend too much of their retirement savings on housing, as this has the potential to undermine income security during retirement.

Cost management

Major public development projects have to receive in-principle approval from the Cabinet, before the development expenditure is considered by the Ministerial Development Planning Committee (DPC), comprising the Minister for Finance, Minister for Trade and Industry and the Minister of the proposing ministry.

As public projects grew in terms of size and complexity, the MOF, with a view towards ensuring better cost management, required that major public sector development expenditures above S$80 million be reviewed by the MOF, before being approved by the DPC. The DPC process helps ensure that project budgets are in line with general cost norms and that other 'value-for-money' alternatives were considered before a decision was made.

[61] Parliament of Singapore, *Central Provident Fund (Amendment)* Bill, 1 August 1968, http://sprs.parl.gov.sg/search/topic.jsp?currentTopicID=00053534-ZZ&currentPubID=00069194-ZZ&topicKey=00069194-ZZ.00053534-ZZ_1%2Bid007_19680801_S0002_T00021-bill%2B (accessed on 30 September 2015).
[62] CLC, 2014.
[63] Ibid.

In 2010, the MOF introduced a more stringent "gateway" process for mega development projects with a value greater than S$500 million or those that are complex in nature. After obtaining the Cabinet's in-principle approval, the project is put through the gateway process, where it is subjected to multi-stage reviews of concept, design and implementation, before submission to the DPC. The MOF also formed a new Development Projects Advisory Panel (DPAP) in 2010, comprising current and former senior public servants and industry practitioners to examine the specifications and designs of mega projects at the early stages of project conceptualisation and design development. A separate committee, the Public Sector Infocomm Review Committee provides inputs in the evaluation process for infocomm projects.

In 2011, a new Centre for Public Project Management (CP2M) was set up as a department under the MOF to provide advisory services on project design and management to public sector agencies, especially those lacking in-house capabilities.

Long-term thinking

With regard to infrastructure financing, the Singapore Government's ability to think long-term is reflected in many ways, such as the decision to spend more than half of the S$871 million budget for the first Development Plan on revenue-generating activities instead of on consumption. It is also reflected in how the Government has continuously tinkered with its financing policies to ensure that they are suited to new problems and new contexts.

Over the years, Singapore's fiscal prudence has enabled it to accumulate a sizeable reserve. The Government put in place a constitutional framework in 1991 to safeguard the reserves from budget profligacy, and at the same time enable the government of the day to spend its investment returns in a sustainable manner.

Singapore's reserves are divided into two portions. "Past reserves" refers to net assets accumulated in previous terms of government such as proceeds from land sales, capital receipts, as well as physical assets such as land and buildings. "Current reserves" refers to net assets accumulated by the current term of government. Singapore uses a strict definition of budget surplus. Current government operating revenue — which excludes interest income, investment income and capital receipts — funds both current operating expenditure and development expenditure. Budget surpluses, if any, are accumulated as current reserves and transferred to past reserves at the end of each term of government.

The constitution contains two rules that promote fiscal responsibility and sustainability, and obligates the government to keep a balanced budget over each term of office (typically five years). The first rule is that the current government cannot draw on past reserves unless with the approval of the elected President. The Government has only drawn down on past reserves once. In 2009, the President agreed to a S$4.9 billion draw-down on past reserves to finance the Budget measures to cope with the global financial crisis. Eventually, the Government only drew down S$4 billion, all of which it returned in 2011 when the economy posted a strong recovery.

The past reserves have also been used to fund land reclamations since 2001, and land acquisitions for the redevelopment of older public housing estates under the Selective En-bloc Redevelopment Scheme (SERS) since 2002. In both cases, the past reserves are used on the basis that these expenditures involve a conversion of the past reserves from one form (financial assets) to another (state land). In other words, there is no net draw on past reserves.

The second rule is that the current government is only allowed to use up to 50% of the net investment returns from the past reserves. The entities investing the past reserves include the Monetary Authority of Singapore (MAS), the Government Investment Corporation (GIC), and Temasek Holdings, an investment company owned by the Singapore Government. Between 2000 and 2008, the net investment returns were defined as net investment income (NII) comprising actual investment income, which consists of dividends and interest less expenses. The NII contribution added close to S$4 billion to the annual budget in some years during this period.

In 2009, the Government amended the Constitution to widen the definition of net investment returns. The intent of this change was to increase the contribution that the past reserves were making to the Government's budget, and to reduce the volatility of these contributions. It came at a time when Singapore's social spending was expected to

rise due to an ageing population and its infrastructure spending was increasing as several enhancements and new developments were being rolled out across the country.[64]

As a result of the amendment, the Government could draw on up to 50% of the expected long-term real returns on reserves invested by GIC and MAS. The definition of investment returns remained unchanged for Temasek Holdings then, because there were no established methodologies for it to compute the long-term expected real returns on its portfolio. Overall, all three entities contributed between S$7 billion and S$9 billion to the annual budget.

From 2017 onwards, Temasek Holdings too will begin contributing up to 50% of its expected long-term real returns to the annual budget.[65] This is expected to increase the annual budget by an average of 1% of GDP each year for the following five years.

Conclusion

Having set the ethos and taken difficult decisions early — such as minimising debt and implementing a tough land acquisition policy — Singapore now enjoys a position of fiscal strength. Its unique system of disciplined public finance and infrastructure financing has also proved to be resilient over the years.

However, Singapore also faces an evolving set of challenges ahead in public sector infrastructure financing. Long-term demographic trends and economic imperatives will require the improvement and expansion of the public infrastructure. Spending on social areas is also expected to rise as the Government works to address key issues such as income inequality and the ageing population. At the same time, there is a need to keep the overall tax structure competitive and preserve a low tax burden for lower- and middle-income Singaporeans. The Government will thus have to continue to find innovative and sustainable ways to meet its future public infrastructure financing needs.

[64] Singapore Parliamentary Reports (Hansard). *Constitution of the Republic of Singapore (Amendment)* Bill. Parliament No:11, Session No:1, Volume No:85, Sitting No:3, 20 October 2008.
[65] Shanmugaratnam, Tharman. *Budget Speech for 2015*. Singapore, Ministry of Finance, 23 February 2015. http://www.singaporebudget.gov.sg/budget_2015/BudgetSpeech.aspx (accessed 15 September 2015)

FIVE

Insights from the development experience of China and Singapore

Achievements and Challenges in Urban Development *Experience of China and Singapore*

Singapore is often known as a model city-state. Since the 1980s, China has devoted much effort to study and learn from Singapore's experience in socio-economic development. Due to the presence of a large Chinese population in Singapore, both countries share similarities in culture, custom and languages. The majority of Singapore's population is Chinese; hence, both countries are, in many ways, similar in culture, custom and language. Many have referred to the relationship between the peoples of China and Singapore as "distant relatives". The marked disparity in size of both countries might lead one to conclude that Singapore's development approaches are not directly applicable to China. However, if one examines closely at the micro level, there are indeed lessons that can be drawn from Singapore. Singapore as a country has progressed from a chaotic, backward tropical island with squalid living conditions toa "City in a Garden", with a competitive economy, sustainable environment and high quality of life. The rich experience that Singapore has accumulated in urban governance, urban planning and development of urban areas is something that China can emulate in its cities. Wang Daohan once said, "China will become a great country if it can create 100 cities like Singapore."*

China has pursued urban development for more than 60 years. As it continues to accelerate its urban growth, scores of Chinese cities, each with a unique character have emerged over time. Lee Hsien Loong, Prime Minister of Singapore, once said that, to China, Singapore is like a "*mini* laboratory." [1] Given that China has so many cities which differ in size, type and character, and which are at different stages of development, China is no doubt a "*mega* laboratory" to Singapore. Today, Singapore faces the challenge of sustaining its vitality with limited land and resources while supporting an expanding population. As Chinese cities progress, perhaps Singapore could find in those cities inspiration for answers. Against this backdrop, both countries would benefit much from greater learning from and sharing with, each other in urban development and urban governance, as they work towards greater liveability and greater sustainability of their cities.

Based on the systematic analyses presented in the earlier chapters, the following section will attempt to recapitulate and distil the experiences of China and Singapore in modern city development in four areas: the urbanisation process, urban planning and governance, development of public housing and financing for urban infrastructure.

The urbanisation process

China and Singapore have proceeded along completely different urbanisation paths. Since its founding, China's urbanisation process has vacillated between glee and gloom, before gaining momentum and seeing urbanisation unfold across the country. Because of differing geographical conditions, level of economic development, and historical and cultural factors, urbanisation in China occurs unevenly. Urbanisation in Singapore, on the contrary, has been guided by a 100-year plan, where every detail is carefully planned, well-balanced and systematically executed.

China's experience

Maintaining social stability amid massive migration

China's new approach to urbanisation (*xinxing chengshihua*) takes place within a populous and traditionally agricultural nation, amidst an unprecedented scale of migration and level of social transformation. Although the *hukou*,(household registration) system prevents migrants from enjoying the same public services as those with local *hukous*, it has not prevented more than 16 million people from flocking to the cities every year for the past 40 years. Continued massive migration has not resulted in serious social imbalances. Balanced development has been sustained because of the substantial job opportunities brought about by rapid economic development during the initial stage. In the later stages, further development came about because of the government's efforts in equalising public services for the migrant population. Except for the mega-cities, most cities have relaxed their *hukou* restrictions, and the percentage of population that has access to social security, such as pension, medical and unemployment benefits, has increased substantially.

[1] Lee Hsien Loong's response to a question posed by a Caixin magazine journalist during his visit to the Committee on Foreign Affairs, Washington, DC, USA on 24 June 2014.

* Note: Wang was China's president of the Association for Relations Across the Taiwan Straits (ARATS). In April 1993, Wang met Koo Chen-fu, chairman of the Taiwan-based Straits Exchange Foundation (SEF) in Singapore to hold the famous "Wang-Koo Summit (*Wang-Gu hui tan*)".

Relatively rapid development of transport infrastructure improves connectivity between cities, and extensive use of Internet technology reshapes the development pattern of cities

China is a vast country, with cities at the prefecture level and above that take up 6.7% of the country's land, 29.5% of its population, and account for 62% of the country's GDP and 61.9% of domestic consumption. To a great extent, these larger cities have profited from progress of transport infrastructure developments such as high-speed rail and highways, as they have increased inter-city connectivity and evolved dynamic city clusters. Transport infrastructure has shortened the distance and travel time between cities, and application of Internet technology further has reduced trading and communication costs, both of which have altered the way Chinese cities develop. With added impetus from the government's "Internet Plus" strategy, small, medium, large-sized cities are able to forge even more nimble trading, production and innovation networks, which would better improve the division of labour and efficiency for cities within the network of cities.

Rapid urbanisation has seen an immense amount of innovative urban development solutions

To break away from the old developmental approach, cities have turned to technological innovation to drive social innovation. Amid rapid urbanisation, local governments have experimented with innovative urban development solutions such as building a knowledge city or eco-city. As at October 2015, more than 373 cities and counties or districts have launched pilot projects of this nature. A knowledge city uses new-generation information technology such as the Internet-of-Things, cloud computing, big data and geographic information service for spatial information to facilitate urban planning, development, management and provision of smart services. Exploring and examining the way cities operate is beneficial, as it enable cities to achieve quantum leaps in discovering new approaches to urbanisation.

Singapore's experience

Highly dense, yet highly liveable, city

In the traditional mindset, cities that are considered highly liveable exist in large geographical spaces with low-rise developments and low population densities. Singapore, however, is an exception that has managed to blendhigh liveability with high density. With 7,028 inhabitants per square kilometre, Singapore does not feel as congested as the numbers might indicate. This is mainly due to the highly intensive development approach that Singapore has adopted. To optimise the utilisation of land resources, the residential and industrial spatial layouts take the form of Housing and Development Board (HDB) estates, comprising high-rise and intensified industrial estates (including industrial parks, commercial districts, financial districts and ports, etc.) which form self-sufficient satellite towns that provide jobs near homes. Singapore's transport system places priority on public transport, and the Government has built a comprehensive and convenient transport system, coupled with an advanced communications and transport control system (including the Certificate of Entitlement [COE] fee to regulate car ownership and the Electronic Road Pricing [ERP] system to control road usage especially during peak hours). In doing so, it has managed to connect the Central Area with all the outlying towns, at the same time improving the efficiency of the whole transport system.[2]

In Singapore, three liveable city outcomes (a competitive economy, sustainable environment and high quality of life) are linked directly to Singapore's outcome indicators at the national level. These indicators are published in the Ministry of Finance's Revenue and Expenditure Estimates for each financial year. The local governments of China could also quantify their development plans in similar ways, to ensure that the liveability outcomes in these cities are effectively executed.

Focus on long-term sustainability

Major redevelopment in Singapore began in the 1960s. From the outset, Singapore dispelled the development approach of "develop first, clean up later." During the early years after independence, Lee Kuan Yew, the first Prime Minister of Singapore, launched the "Clean and Green Singapore" campaign, and envisioned Singapore as a tropical Garden City. All subsequent urban development efforts were designed around this target. As the various plans were implemented, not only was Lee's ideal realised, but Singapore has gradually been transformed from a Garden City into a "City in a Garden", that is, not just a city with many gardens but with an even larger vision — for the whole city to be developed holistically as if it were one big garden. Singapore is set to become a city that exists in harmony with nature.

[2] Liu (2011), *Singapore's Urban Planning, Development and Management—Experience and Insights*. Report of the Development and Research Centre, State Council. Vol. No. 177 (Gen Vol. No. 3932).

Since independence in 1965, one of Singapore's long-term focus has been to build a sustainable environment. This vision has been achieved through the establishment of institutions including relevant government agencies, systems and policy design and implementation. For example, during the mid-1970s, when the Japanese company Sumitomo wanted to build a chemical factory near one of Singapore's town centres, the Economic Development Board (EDB), the government agency responsible for attracting inbound foreign investments, was very excited, for this would have been a major project that would bring about substantial economic benefits. However, the Ministry of Environment was strongly against it. The case was subsequently submitted to the Cabinet and Prime Minister Lee. Lee overruled EDB's decision and said "no" to the project unless Sumitomo agreed to follow the pollution control regulations. Eventually, Sumitomo agreed to locate the project in Jurong Industrial Estate (far away from the city centre). They also adhered to the strict environmental protection measures to ensure that their factory's polluted effluents met discharge standards.

Roles of the government and the market are clearly defined
Singapore has been harnessing market forces to efficiently allocate and price scarce resources such as land, water and energy for optimal utilisation. To effectively adopt a market-based approach, Singapore has clearly defined the roles of the government and the market. The Government Land Sales system is one key example of how the Singapore government involves private sector participation in urban development. The Government specifies the detailed guidelines of urban development according to the Master Plan, and the private sector is then invited to participate in the tender. One recent example is the Urban Redevelopment Authority (URA) Land Sales programme for the Marina Bay area, where the Government tapped the private sector's creativity and expertise.

The Electronic Road Pricing (ERP) scheme is another key example where land-scarce Singapore has successfully applied and implemented a market-based approach to curb congestion by regulating road usage based on user demand through imposing a surcharge for use of the roads during peak hours.

Government departments with coordinated and clearly defined responsibilities
The Singapore Government has shown a high level of administrative innovation, as different government departments coordinate and define their responsibilities, and official responsibilities are allocated logically to focus on desired outcomes. It has therefore ensured the scientific rigour and professionalism of its urban planning and urban governance, and ensured that plans are effectively executed.

The key concepts that have been put into practice are as follows:
First, separation of politics and professional services. While politicians focus on broad strategy and policy, the relevant professional and technical issues are handled by the agencies with the professional knowledge and skills, which ultimately means less executive interference in urban development for political purposes or self-interests.

Second, a "Whole-Of-Government" (WOG) approach and clearly defined respective roles are adopted by all government agencies in urban development. Take urban planning as example, the HDB, Jurong Town Corporation (JTC) and Land Transport Authority (LTA) are responsible for residential New Towns, industrial parks, and the planning, building and management of public roads respectively. Powers and responsibilities are clearly defined and legally enforceable, to ensure that the responsibilities of agencies are properly carried out as required.

Urban planning and urban governance

Rational urban planning and effective urban governance are important pre-requisites for achieving sustainable, healthy and well-ordered urban development. Some say that Singapore is a city engendered from planning. Indeed, forward-looking, evidence-based and professional urban planning has laid the foundation for urban development in Singapore.

China's experience

Encouraging local governments to find innovative localised approaches to urban governance
Local governments are in the best position to comment on urban governance. Therefore, they should be encouraged to explore different methods, and be recognised for the results they achieve through their pilot projects. When the time is ripe, the successful models can be scaled-up and replicated nationwide. For example, Foshan City, in Guangdong Province, launched a pilot project on community grid management (refer to Box Story 1). The pilot project was exemplary in its use of instant communication tools, simplification of work processes and improvement of emergency response.

Box Story 1: **Ten Nanhai communities pilot grid management**

Nanhai District of Foshan City, Guangdong Province, selected 10 communities from Shishan Town's Luocun Management Office, Dali Town and Lishui Town as pilot sites for community grid management. The pilot communities were divided into 92 grid cells, based on the nature of their district, i.e, whether they are a commercial and residential district, industrial district or mixed-use district. A matrix task force was allocated to each cell according to a "1+2+N" formula (where one grid cell length would have at least two grid cell officers, and N number of volunteer grid cell information liaison officers). The task force would then develop a community inspection duty list, and follow a five-step process to "collect information – dispatch task – attend to task – feedback on result – verify and close case" to handle matters occurring within the grid cell, so as to establish a regular mechanism for grid operations.

Nanhai has also developed a "4G Service Community Grid Management System", whereby the grid cell officer can download the application to a mobile device, or upload the basic information of residents or merchants located in the grid cell, to share information with the community.

Grid management separates investigatve tasks from response, as the official responsibilities of the communities' officials and the community grid cell officers are clearly defined. When a grid cell officer discovers problems during inspection, he can make use of the 4G network to upload information instantly, and, depending on the nature of the problem, the respective department will deal with it accordingly. This is one way to ensure that problems are dealt with effectively upon discovery, so that the government can improve its effectiveness in community service.

Singapore's experience

Vision, democracy, professionalism and authority in urban planning

Singapore's urban planning system has a three-tier structure: the Concept Plan, Master Plan and Development Guide Plans. The Concept Plan is the strategic plan that guides Singapore's urban development over the next 40 to 50 years, and is revised every 10 years; the Master Plan is 10 to 15 year implementation plan that translates the strategies set forth in the Concept Plan into detailed actionable tasks, and is the statutory basis for managing development activities. The Development Guide Plan divides Singapore into five regions and comprises 55 Planning Areas. Each Planning Area has its own development guidelines on land use zoning, transport organisation, environmental improvements, etc. The Government controls and manages urban development according to the detailed guide plans and the government land sales programme.[3]

Planning requires long-term thinking. During the early years of independence, planners focused on addressing the city's future development from a developmental perspective. They set a planning time frame of 100 years for a global plan, as this not only enabled land resources to be utilised effectively, it also considered the short-term and long-term development needs. If only the short-term and medium-terms had been accounted for and long-term needs neglected, the city would have suffered consequences, and certain development projects would not have been able to achieve the expected results even a few years after completion.

Urban plans must be executed effectively. To ensure that the mandatory and authoritative powers of urban plans are observed, Singapore has enacted relevant laws and empowered implementing agencies with the necessary statutory powers to ensure that the Master Plan is executed effectively. As the only agency administering the plan, URA is endowed with the powers to ensure that all planned projects are in line with the relevant detailed plans, laws and norms and the overall directive as set out in the Master Plan, so that they serve the Government's development goals.

Professionalism is paramount in planning. Singapore has a tradition of valuing and respecting experts. The same applies to the planning sector. A good urban Master Plan would take at least 20 to 30 years to bear the initial fruits. Planners must spend a lot of effort researching and studying the planned environment in order to forecast the future development of the city being planned. This is the only way to do a good job in urban planning.

[3] Guo Yanju, *Singapore's Urban Planning, Development and Management—Experience and Insights (Xin jia po cheng shi gui hua jian she guan li de jing yan ji qi shi)*, Sanya Daily, 3 August 2015.

On the one hand, government officials should recognise that they lack professional knowledge and training for crafting plans, and must therefore give full respect and trust to the recommendations of professional planners. On the other hand, planners must pay a lot of attention to the conditions on the ground, and not of focus only on official instructions. If the coordinating officials lack professional knowledge and disregard expert advice, disaster would usually ensue.

Increasing public participation in planning. The Singapore's Government believes that urban planning is a rational and a democratic decision-making process.[4] For the plan to better meet public demands, the government has to increase publicity, and incentives for interaction, relying on various means to attract and encourage the public to voluntarily participate in urban planning and provide feedback. The government usually solicits public opinion soon after completion of the Development Guide Plans, so as to leverage on the power of collective wisdom and maximise public participation in the planning process.

Development of public housing

China's experience

A unique Chinese housing programme based on national specificities

A housing programme which caters to different income groups and housing needs by providing different forms of housing security. Public rental housing, for example, is targeted at low-income and middle-to-low income urban residents as well as migrant households without local *hukous*. Since lower-income households pay extremely low rental, it is also called "low rental housing (*lianzu zhufang*)." Redeveloping squatter areas, including the renewal and rejuvenation of towns/townships, industrial mining areas, forest areas, farming areas and squalid locales is an important dimension of the "Security-based Stable Living Programme" (*baozhang xing anju gongcheng*). Also, affordable housing, which targets low-income urban households, is security housing for which the Government sets aside land and sells at minimum profit, and for which buyers have title rights. Controlled-price commercial housing (*xianjia shangpinfang*) is a type of public housing that has limited choice of layouts and is subject to controlled prices. Applicants for this type of housing are usually low-income indigent households in towns and townships. Rural households also enjoy "risky housing rehabilitation subsidies (*weifang gaizao buzhu*)." Security housing is also provided specially for vulnerable groups, such as persons with disabilities.

Priorities in the supply of security housing changes with the different stages of housing development. For example, in 2007, the "State Council's Opinions in Resolving the Housing Problems of Urban Households" (*Guo Fa* [2007] No. 24) required that priority be given to low rental housing to ensure that the needs of the needy are addressed as much as possible (*yingbao jinbao*). By 2013, China had begun its massive rehabilitation of squatter areas, and the focus of security housing was in turn adjusted. Hence, China's housing security policy presents a uniquely Chinese model which is suitably flexible and adapted to local circumstances.

Multi-means and multi-channel financing led by the government, based on market forces

Considerable fiscal support is provided by the various levels of government, and the differences between different regions and groups are given thorough consideration. For example, in 2014, various levels of government contributed a total of RMB 560.16 billion in fiscal funding for the housing programme. The Central fiscal fund contributed RMB 198.4 billion. For more efficienct fund utilisation, the central fiscal authorities gave priority to providing subsidies for the rehabilitation of squatter areas. The government adopted differentiated treatment, and adjusted the proportion of central fiscal funding as appropriate, based on the volume of work, fiscal capability and final outcome. The central and western regions and key squatter rehabilitation projects were given priority.

Leveraging state-backed financial instruments. Since setting up its Housing Finance Division, the China Development Bank (CDB) has adopted a market-based approach, as well as a transparent and efficient method to obtain financing, i.e., through the issuance of special principal-guaranteed,

[4] Yuan, *Insights to China's Urban Planning based on an Analysis of Singapore's Urban Planning (Ji yu xin jia po cheng shi gui hua fen xi dui zhong guo cheng shi gui hua de qi shi)*, Zhongzhou Construction, 2013 (5).

Note: The housing programme has three main parts: 1. Construction of security housing, including low-rental housing, affordable housing, public rental housing and controlled-price commercial housing; 2. Rehabilitation of squatter areas, squatter sites on state-owned public mines, squatter sites on forest areas, squatter sites on farming areas, and squatter sites on coal mines. 3. Rehabilitation of risky, rural homes and settlement of nomads. Extracted and translated from: http://baike.baidu.com/view/5272959.htm

low-yield financial instruments. With well-regulated operations, CDB's model has become an important low-cost and stable source of financing for rehabilitating squatter areas. In 2015, CDB's total budgeted loans for squatter area rehabilitation amounted to RMB 700 billion yuan. With the added responsibilities of rehabilitating risky, rural housing, the Agricultural Development Bank of China has also become an active supporter of squatter site rehabilitation programmes.

Developing other financing channels. In 2014, through bank loans, the issuance of corporate bonds and other private financing means, the development entities of Stable Living Housing managed to raise RMB 1,063.18 billion in funding. Some local governments gave priority to rehabilitation of squatter sites rehabilitation and the Stable Living Programme (SLP) by releasing projects proceeds from government bonds issued on behalf of them by the Ministry of Finance for use in these projects. Some local governments even tried to attract private capital for the SLP, an example being Anhui Province, which issued Squatter Sites Rehabilitation Income Bonds.

A unique land allocation mechanism for housing security

The central land regulatory authorities attach importance to the planning and quantity of land supply. The Ministry of Land and Resources (MLR) separates land use for SLP from urban land use, where applications are reviewed once every year; instead, separate files are established for SLP land use applications so that these can be reviewed separately to speed up the application and review process and the assignment of land quota to the various levels.

Local governments prioritise land for SLP when supplying land. For example, Jiangxi province requires all towns and counties to ensure that there is a supply of SLP land, and to set aside land for SLP land use at the start of the year. Some local governments would stop supplying land for commercial use in areas that do not meet the requirements for SLP.

For squatter site rehabilitation programmes, the demolition of squatters and land acquisition exercises are carried out with due regard to transparency and equity; existing residents are given opportunities to participate in the entire rehabilitation process in order to minimise conflict between stakeholders, and to resolve them as early as possible. For example, in Chengdu district and Yiyang City of Hunan province, the people's wishes are given full respect, and the governments actively explore an "autonomous renewal" model, which engages the people under the government's leadership. This gives voice to reasonable demands, reduces conflicts during the demolition and relocation (*chaiqian*) exercise, and enable smooth implementation of the rehabilitation project.

Singapore's experience

Systematic public housing scheme and policies, specially crafted to incorporate social policies

A unique feature of Singapore's public housing policy is its comprehensiveness and systematic structure. Key institutional arrangements, the relationship between housing and social policies, and operating mechanisms, etc. are systematically framed, such that the entire policy system runs smoothly and efficiently. As a key administrative authority for public housing, the HDB is solely responsible for all housing policies and all housing development. This way, residents are spared the fate of homelessness after their existing homes are demolished. It also ensures that the public housing system operates efficiently and in a closed-loop management environment. Singapore's public housing policy is also underpinned by robust laws and a sound financing framework.

Singapore's public housing system and policies comprise the home-ownership scheme, Land Acquisition Act and Central Provident Fund system. Essentially, these three forms of institutional arrangement determine three basic factors: the policy's valuation proposition, the way land is supplied, and the means of financing. They are three interdependent pillars and mutual safeguards that provide the systemic support for the smooth implementation of Singapore's public housing system and policy.

Public housing system and policies in Singapore emphasise alignment with social policies. Singapore's public housing policy embodies its social policies, in that as the "HDB Flat" system evolves and improves, consideration is not only given to housing problems, but also to social management issues. This includes: housing policy and building good family and inter-generational relationships (with three-generation flats); housing policy and facilitating ethnic integration (every block and neighbourhood must satisfy a certain Ethnic Integration Policy

(EIP) proportion set by the Government); mixed living of households from different income brackets and harmonious development of the community; infrastructure development and improving the convenience of living amenities for residents.

Using legislation, financing, construction, subsidies, etc., to create a coordinated support mechanism for the public housing system.
A well-designed legal framework with sound implementation ensures the effectiveness of Singapore's public housing policy. For example, the Housing and Development Act empowers the HDB to exercise power relating to the development and management of public housing. Before these laws were enacted, there was a long process of deliberation and much contention between the stakeholders. With laws such as the Central Provident Fund Act and Land Acquisition Act, there has been no more major resistance during implementation. For financing, the CPF Board and HDB, both statutory boards, have established a good operating mechanism. For development, there are clear guidelines that regulate the quality of housing and construction costs.

Peopled-oriented provision of housing is based on the different needs of households in different stages of their lives
Singapore's public housing system has always been people-oriented. By providing low-cost rental and affordable sale options, and encouraging the buying of homes, etc., it effectively provides a public housing supply for residents based on the different phases of a family life cycle.

First, it provides public housing products based on the housing needs of different family life cycles. For example, "unmarried couples" may apply for HDB flats as a family. When a young family is small, more support is provided. When the family becomes bigger, it can upgrade to a bigger flat (Singaporeans call it the "second bite of the cherry"). Upon old age and retirement, homeowners can downgrade to a smaller flat, and use the extra value obtained from selling their original flat to supplement the retirement income. An elderly flat-owner has the option to sell part of the flat's remaining lease to the HDB to unlock housing equity to meet their retirement needs. This comes under the HDB Lease Buyback Scheme (LBS), a monetisation option introduced by Singapore to help elderly households in three-room or smaller flats unlock their housing equity to meet their retirement needs.

Second, it provides public housing based on the housing needs of households from different income brackets. For example, building small-size flats and low-rental flats for low-income families. For the ever-expanding middle-income group, that is, "sandwich class" families that are not eligible for the original application criteria, other products are provided to meet their needs, such as larger homes and executive condominiums. Currently, China still lacks policies that target new citizens and "sandwich class" families. The quantity of public housing that serve this group could be increased and with stronger policy support.

Renewal programmes for old flats to improve utilisation of public housing resources
To avoid under-utilisation of HDB flats and matured estates from "greying" and withering, the Singapore Government has introduced policies such as the HDB Upgrading Programme and Selective En-Bloc Redevelopment Scheme (SERS). Two key lessons have emerged from Singapore's experience:

First, carry out continued improvement to the quality of old housing. By stepping up efforts to upgrade old flats, residents' increasing demands for housing quality are met. At the same time, upgrading is not only confined to individual units, but is also carried out at the precinct level such as reconstructing the urban profile and integrating urban functions to create new, high-quality communities. Some flats are demolished while others are were refurbished based on practical considerations. Some demolished flats are rebuilt for total rehabilitation, and others are not demolished, but are instead partially rehabilitated by refurbishing parts of the flat that are functionally deficient.

Second, ensure sustainable utilisation of public housing resources. Through good management as well as maintenance and betterment, the functional positioning of different communities can become more apparent. For example, certain flats in older precincts clearly became attractive to the younger generation after improvement works were carried out, while others boast more elder-friendly lifestyles and landscapes, with a more leisurely and liveable ambience, which addresses the specific housing problems of an ageing population.

Experience in managing open housing estates
Given its small land area, Singapore must account for every inch of its land even at the planning stage. Its many HDB flats are designed in a way that forms open housing estates. When planning an estate's

transport system, green spaces and public areas, much attention is paid to ensuring that such infrastructure is conducive to high-quality urban living, so as to create a truly vibrant estate.

Despite having an open concept, the estates are not disorganised or scattered. For example, the Residents' Committee would organise different community activities to foster and enhance community spirit. Programmes such as "Community in Bloom" allow residents to partake in gardening activities build cohesiveness among them.

Financing for urban infrastructure

As urbanisation continues and the demand for urban infrastructure rises, China and Singapore have to explore other financing avenues such as tapping into private capital to finance urban infrastructure. Not only will such public-private partnership (PPP) financing models help relieve the fiscal pressure on the government, tapping private capital will also create more opportunities for private sector participation and draw on the private sector's innovation, expertise and efficiency.

China's experience

Leveraging the PPP model to drive urbanisation

Urbanisation requires China to invest massively in urban infrastructure development, a need which has ushered in local government financing vehicles (LGFVs). LGFVs have been essential during the most critical period of urban infrastructure development. But the lack of effective regulation of these financing vehicles, and flawed internal processes on the part of some of these corporations, have caused some local governments to incur huge debts. This has led to the State Council, banning the use of LGFVs and forbidding any additional government debt as decreed in three documents issued in September and December 2014, and May 2015. Against this backdrop, the National Development & Reform Commission (NDRC) and the Ministry of Finance began to promote the PPP model on a nationwide basis.

Overall, while the original local financing model faces transformational challenges, the more regulated PPP model can take on some of the financing burden. Getting private capital to invest in infrastructure and public services would, to some extent, stabilise the growth of local investment. The PPP model can also mitigate the debt burden of local governments. This is especially true for investments in municipal infrastructure which yield steady returns, such as wastewater treatment, water supply, power supply, heat supply, etc. Not only does the PPP model bring in private capital during the development stage of public services, but it also introduces professional management concepts and methods to public service operations, and ensures that the government "leaves professional matters to the professionals", thereby improving the efficiency of public services.

Singapore's experience

Encouraging statutory boards to tap Singapore's capital markets to meet infrastructure-financing needs

Since 1998, the Singapore Government has encouraged statutory boards to turn to capital markets for part of its infrastructure-related financing needs. While statutory boards are able to operate with greater flexibility and autonomy compared to some governmental departments, they are nonetheless legal establishments that are administered under a sound regulatory system. As they carry out capital operations involving equities and bonds to obtain financing, and financing needs are satisfied, the government's credit risk can be effectively controlled. For example, HDB obtains financing from various channels: one, government subsidies — the government subsidy will make up for the shortfall in funds to ensure that the price of HDB flats is lower than market price and remains affordable; two, obtaining financing from the market — mainly from the sale of HDB bonds under its under Multicurrency Medium Term Note ("MTN") Programme. Under HDB's MTN programme, HDB may, from time to time, issue bonds (or notes) to finance its development programmes and working capital requirements as well as to refinance the existing borrowings.[5]

Adopting fiscal prudence and self-reliance, and long-term thinking

The Ministry of Finance's focus on fiscal prudence, self-reliance and long-term perspective is manifested in the Central Provident Fund (CPF) and the past reserves systems.

CPF is a mandatory savings programme. Every employee has a CPF account, and a certain percentage of his earnings are deposited into his CPF account. Singapore citizens may pay for their HDB flats and

[5] Housing Development Board (2015). Retrieved from http://www.hdb.gov.sg/cs/infoweb/press-releases/hdbs-first-issue-of-rated-fixed-rate-notes_03112015

service their housing loans with their CPF savings. Another purpose of the CPF is that it provides the government with a stable source of infrastructure financing for HDB.

To prevent the government from relying on land sales as a source of revenue, all land sales proceeds, including receipts from land transfer and other receipts generated from land and physical assets are not recognised as revenue for the current period. Instead, they automatically become a part of past reserves which the current government cannot spend unless the Elected President gives approval for the use of the funds. This ensures sustainability of public finance, as future major expenditure is undergirded by income.

Pricing public utilities and services right

Market pricing is generally used where existing markets can be tapped to recover cost and discourage excessive and unnecessary consumption. The way in which Singapore prices its public utilities may provide useful reference for others. In public utilities, foreign investors are typically is interested only when the price is set according to the market. Also, if the project duration is too lengthy, the private sector might not be keen as the prolonged duration could be an indication of significantly increased risks and uncertainty. To ensure transparency, it is also important that the return structure of PPP projects is well-defined and the existing government policies on PPPs are clear.

In supplying public goods and services such as electricity, a differentiated pricing approach is important in ensuring equity access by all income groups. For instance, the electricity bills of more affluent families can be charged according to market price while the government provides subsidies to low-income families. As long as the public utilities are priced to ensure that the returns and the project duration are sustainable and reasonable, investors are likely to be interested in investing in such projects.

Adopting the "Yellow Pages" principle

The "Yellow Pages" principle means that the public sector assesses the necessity of providing goods and services that are already provided by the private sector. If the private sector is effectively providing the goods and services in an effective manner, the government should leave it to the private sector rather than stepping into these sectors and competing with the private sector. One example is Singapore's National Parks Board (NParks) which is very experienced in nurturing plants and trees, does not compete with private contractors in providing such services, as the private contractors in Singapore have also shown to be competent and efficient in providing such services.

The rationale is that if the market can do it, then it should be left to the market. Another example is that although the HDB is competent in the construction of public housing, it nevertheless invites private contractors to bid for public housing projects. The overall strategy is that the government should focus on its core functions as a government, and should not expand into such that it overlaps, competes or even crowds out the private sector. The government should step in only where the market is a non-existent, or where the market has failed to provide certain public goods and services.

This chapter is compiled and edited by DRC Assistant Research Fellow Wang Yingying.

Epilogue

2015 marked the 25th year of the Sino-Singapore diplomatic ties. On 2 July 2015, the Ministry of National Development (MND)/Centre for Liveable Cities (CLC) of Singapore signed a Memorandum of Understanding (MOU) with the Development Research Center of the State Council (DRC) of the State Council of China, witnessed by China's President, Xin Jinping, and Singapore's President, Tony Tan, during President Tan's state visit to China. The MOU aims to facilitate knowledge-sharing through joint research in areas of interest to both countries for the next five years. A key deliverable of the MOU is this inaugural joint publication (2015–2016) on urban governance, which is based on the research undertaken by experts from both DRC and CLC. In preparation for this book, ***"Challenges and Reforms: Insights from the development experience of China and Singapore"***, concerted efforts were undertaken by both teams via a joint workshop, and discussions and meetings with Singapore government agencies.

Singapore is a city-state while China is a significantly larger country. Despite the marked disparity in size, both countries share many similarities in various areas, including urban governance, urban planning, public housing and infrastructure financing. Singapore has progressed from a dilapidated, poor and backward city to a "City in a Garden" with a competitive economy, sustainable environment and high quality of life. It has accumulated rich experience in urban planning and governance. While China has experienced the most widespread and fastest urbanisation process in the history of mankind since its reform and opening-up in the 1980s, it has also had to overcome problems faced while improving the urban environment, challenges on urban governance processes and faced urban 'diseases'. Against this backdrop, it is mutually beneficial for both countries to learn from each other's urban development experiences in order to create even more liveable and sustainable cities. We hope this inaugural CLC-DRC joint publication in urban development will provoke more in-depth discussion on how to create liveable and sustainable cities, and contribute to achieving China's goal of "creating harmonious, liveable, vibrant, distinctive modern cities".

This book comprises five sections: an urbanisation overview, urban planning and urban governance, urban public housing development, infrastructure financing and urban development, and insights from the development experiences of China and Singapore.

China's Urbanisation: The Path, Paradigm and Policies (Section 1, Chapter 1) is written by DRC former Vice Chairman Liu Shijin, Director-General (DG) Hou Yongzhi, Deputy Director-General (DDG) Liu Peilin and Deputy Director Zhuo Xian. ***Singapore's Experience in Urbanisation*** (Section 1, Chapter 2) is penned by Executive Director of the Centre for Liveable Cities (CLC) Khoo Teng Chye. ***China's Urban Planning System: Issues and Reform Path*** (Section 2, Chapter 1) is co-authored by DRC Deputy Director-General Wei Jianing and North China Electric Power University Associate Professor Chen Jianguo. ***Intelligent Urban Planning in Singapore: Practice and Insights*** (Section 2, Chapter 2) is authored by Dr Liu Thai Ker, founding Chairman of the CLC Advisory Board, and former CEO of Singapore's Housing and Development Board (HDB) and Urban Redevelopment Authority (URA). ***Complexity and Urban Governance*** (Section 3) is written by URA Chairman Peter Ho and Executive Planner Joyce Ng. ***Public Housing in China: Progress, Challenges and Policy Recommendation*** (Section 3, Chapter 1) is jointly prepared by DRC DG Ren Xingzhou and Director Liu Weimin. ***Home, Community, Identity: Singapore's Public Housing Story*** (Section 3, Chapter 2) is written by Chionh Chye Khye, former Deputy CEO of HDB and CLC Senior Assistant Director Louisa Khoo. ***PPP: Driver of China's New Urbanisation Approach*** (Section 4, Chapter 1) is contributed by DRC Vice Chairman Wang Yiming, DDG Meng Chun, DDG Wei Jianing, DDG Chen Changsheng, Deputy Director Zhuo Xian and Assistant Research Fellow Wang Yingying. ***Financing Infrastructure and Development: A Sustainable Approach in Singapore*** (Section 4, Chapter 2) is co-authored by Low Sin Leng, former Deputy Secretary of Singapore's Ministry of Finance and Ministry of Trade and Industry, and CLC Senior Assistant Director Jean Chia. ***Achievements and Challenges in Urban Development: Experience of China and Singapore*** (Section 5) is compiled and edited by DRC Assistant Research Fellow Wang Yingying, based on the comments of experts from both sides. In addition, she is responsible for editing the Chinese version of this book.

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27 June 2016

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