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How to finance an equitable and sustainable development with land values?

Master's Thesis Spatial Planning
Specialisation Cities, Water and Climate Change
Nijmegen School of Management
Radboud University
August 2024

by Tim van Ark

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Word Count: 25,197

Summary

According to CCFLA (2017), more than one trillion U.S. Dollar is missing each year for urban investments, greatly limiting cities' greening efforts. This investment gap is especially severe in developing economies due to their budget constraints. Land value capture promises to overcome this financial problem, as it enables governments to capture increased property values resulting from public investments. When Singapore and Hong Kong were rapidly developing between the 1950s and 1990s, they successfully captured land value increments through public leaseholds (Alterman, 2012; Hui et al., 2004). However, it is important to assess whether their practices were also equitable and sustainable. This research aims to explore the potential (and limitations) of public land leasing in balancing planning goals such as equity and sustainability. Based on a LEED ND assessment of six new towns, three in Singapore and three in Hong Kong, recommendations for developing countries today are drafted. The assessment is complemented by a literature review into the equity of public leasehold systems. The review is based on the NUA framework for sustainable urban development.

The LEED ND assessment indicates that the sustainable performance of Singaporean and Hong Kongese new towns is insufficient, as they failed several prerequisites. The lack of environmental legislation for the protection of imperilled species was an issue in all six new towns under study. Connectivity also left something to be desired as intersection densities were too low. Apart from the prerequisites, the new towns seem to score highly on categories related to housing, amenities, and density. On the other hand, they perform poorly regarding ecological and communal aspects. Overall, Singaporean new towns performed equally or better than Hong Kongese ones.

These performances can be explained by a variety of urban policies. The Singaporean approach to regulations, urban design, and finance is characterised by far-reaching government interference, whereas Hong Kong had a far more liberal approach. The strict control by the Singaporean government guaranteed the quality of new town development. The Land Acquisition Act prevented speculation, essential facilities were provided on time, and social engineering promoted integration and fostered political stability. Moreover, the housing programme successfully capture land values. Hong Kong's less centralised approach has left room for mistakes. For example, essential private investment was discouraged by the slow delivery of infrastructure.

Both approaches to new town development can be recommended. The choice should be based on a developing country's current position. Additionally, owning public land is crucial if a developing country today also wants to replicate the Singaporean or Hong Kongese public housing programmes. If the government does not yet possess land, powerful land acquisition legislation is recommended. Regarding social aspects, some level of segregation prevention is recommended, as it builds more stable societies. In the case of environmental sustainability, plan for future transit systems, even if funds are not available today.

Preface

This Master's Thesis is the conclusion to my four-year degree in Spatial Planning. It is the result of the experiences and knowledge I have accumulated, as well as the personal hardships I have endured and the personal achievements I have gained during my past six years as a student. To you, my reader, this thesis might be a delightful attempt at the real academic work. If I am lucky, you might even find it endearing. To me, this thesis represents the end of an era. A period during which I grew form adolescence to, I daresay, adulthood.

I had an absolute blast learning about new town development in Singapore and Hong Kong. After having studied spatial planning for four years, I felt like I could put all my knowledge and experience in this one topic. It covered a wide variety of topics that are close to my heart, both in my studies as wel as privately. From sustainability to history, from grand visions to the reality of urban life. I have always wanted to learn more about spatial planning in East-Asia. This thesis was the perfect opportunity to do so.

During the research, I was often afraid I would hit a wall, find a website or an article that would be in Cantonese (and therefore beyond my linguistic comprehension), or that the information I needed would simply be unavailable from halfway across the globe. Every time I was amazed by how much information is out there and available in English. Of course, Singapore and Hong Kong used to be British Crown colonies. English being the administrative language in these parts of the world is the heritage of this history. Still, I am pleasantly surprised.

Researching Singapore and Hong Kong was at times like reading a dystopian sci-fi novel. Not to say that these cities are dystopian. Rather, the way urbanisation is approached in these cities felt so foreign at times, if only because the new towns under examination in this paper are about the size of the city from which I am writing this thesis, Nijmegen. It is comparable in size to Ang Mo Kio or Bedok, but much smaller than the Hong Kongese new towns. While Nijmegen grew to its current size over about two millennia, Singapore developed two dozen new towns the size of Nijmegen in a twenty-year period. This goes to show the enormous magnitude of what this small city-state has achieved.

Dr Liu Thai Ker was CEO of the Housing & Development Board for twenty years and oversaw the development of those two dozen new towns. I came across one of his interviews when searching for literature. It was truly inspiring to read about his experience in developing, in his words, a "backwards" country into a first world city. His vision for urban planning resonated deeply with me:

> *"I often suggest that a good vision for urban planning must come from the values of a humanist. A good urban planner needs to have a humanist's heart to give the right values and to care for the people. He also needs a scientist's head to put the parts of the urban plans together very logically. And finally, the urban planner needs to have an artist's eyes to romance with the land and create a beautiful environment. We need all three aspects together"* (Editorial Team, 2017, p. 4).

Finally, I would like to thank my family and friends for their support. In particular my partner, my mom, and my best friend, who after hearing all my thoughts and theories could almost qualify for a degree in spatial planning themselves. I also want to thank my supervisor, Klaas Kresse, for giving me the space to write about something that truly interests me.

Tim van Ark,
Nijmegen, August 27, 2024

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1 Introduction to the research

1.1 Research problem

There is almost a full consensus among the scientific community that global climate change is human induced (Lynas et al., 2021; Myers et al., 2021; Powell, 2017). To limit the increase in the global average temperature to well below 2°C, the Paris Agreement was adopted in 2015. The agreement recognises that crossing the 1.5°C threshold means risking far more severe climate change impacts, such as more frequent and severe rainfall, droughts, and heatwaves (UNFCCC, 2015). That same year, the United Nations 2030 Agenda for Sustainable Development was also adopted. Both treaties signal a paradigm shift from a "top-down" approach to a "bottom-up" one. Rather than setting international mandates, they seek out a country-driven implementation process. The Paris Agreement combines the top-down Sustainable Development Goals (SDGs) with bottom-up Nationally Determined Contributions (NDCs). This means that individual countries can set their own goals, targets and contribution (Dzebo et al., 2019). As a result, more pressure is put on local and regional governments to meet these global commitments.

According to CCFLA (2017), Cities Climate Finance Leadership Alliance, more than one trillion U.S. Dollar is missing each year for urban investments, greatly limiting cities' greening efforts. This investment gap is especially severe in developing economies due to their budget constraints. To make matters worse, traditional methods of raising revenues for local and regional governments are unlikely to meet the financing needs for sustainable development. Innovative financial approaches are needed to meet the global commitments (CCFLA, 2017). Land value capture promises to overcome this financial problem, as it enables governments to capture increased property values resulting from public investments. This makes it a powerful tool for developing economies to finance public projects, such as public transport or housing (Floater et al., 2017).

Land value capture can be achieved through different means, for example developer obligations, land readjustment, or land pooling (Gielen & Van Der Krabben, 2019; Kresse & Van der Krabben, 2022). When Singapore and Hong Kong were rapidly developing between the 1950s and 1990s, they successfully captured land value increments through public leaseholds (Alterman, 2012; Hui et al., 2004). The system is still in place today: both cities sell property (e.g. land or apartments) for a specific term (e.g. 75 or 99 years). After the lease term ends, the property is returned to the government. This allows the government to maintain control over the limited land resources. The proceeds of the development can be reinvested for the improvement and expansion of housing or public infrastructure (Fainstein, 2012). More places around the world use public leaseholds. For example, Amsterdam uses it to subsidise social accommodations (Fainstein, 2012), while Canberra uses it to obtain low-cost land for building (Archer, 1977). The Singaporean and Hong Kongese models were successful at funding public investment. In this regard, the success of public leasehold can serve as an example for developing countries today. However, it is important to assess whether their practices also live up to equitability and sustainability standards today.

1.2 Research aim and research questions

From the research problem follows the main research objective. This research aims to explore the potential (and limitations) of public land leasing in balancing planning goals such as equity and sustainability. The research includes an evaluation of the public leasehold policy, as well as an evaluation of how this policy has been implemented in terms of the spatial arrangements and its impact on social outcomes. It entails an assessment of how (1) the rules and regulations, (2) the urban design, and (3) financial plans came together. Recommendations for developing countries today can be drafted based on the findings. This research aim is translated into the following research questions:

What can be learned from the Singaporean and Hong Kongese public leasehold system applied in an equitable and sustainable manner during times of rapid urbanisation?

- What is the sustainable performance of Singaporean and Hong Kongese new towns built during their periods of rapid urbanisation?
- How can these performances be explained, considering the rules and regulations, urban design, and financial plans that make up the urban policies of these cities?
- What recommendations can be made for developing countries considering employing a public leasehold system?

1.3 Scientific relevance

There is some literature available on land value capture in Singapore and Hong Kong and on the performance of their new towns. Hui et al. (2004) identified the different property taxes levied in Singapore and Hong Kong, although under a narrow definition of land value capture. The OECD and the Lincoln Institute of Land Policy (2022) also identified the land value capture instruments in Singapore and Hong Kong, however, under a broader definition. Their definition corresponds to most definitions used in land value capture research, e.g. the one used by Ingram and Hong (2012) and Kresse and Van der Krabben (2021). Phang (1996) judged to what extent land value capture in Singapore corresponds to Georgism. This is an economic theory that proposes a land value tax, which should promote social justice and prevent land speculation, resulting in a more efficient use of land. Phang found that land value capture in Singapore had little regard for horizontal equity, due to selective subsidies and taxes that mostly serve to promote economic growth.

Despite the abundance of studdies, land value capture and the performance of new towns are rarely explicitly connected. Heo (2014) wrote on the development of the housing policy between 1960 and 1990, however, without mentioning that public housing flats are sold on leaseholds. This is remarkable, as without this form of land value capture, public housing in its current form would probably not be feasible in Singapore. Vasoo (1988) wrote on the social consequences of new towns. Regarding ecosystem services, Richards et al. (2020) found that the older generation makes greater use of ecosystem services, while the new generation mostly uses cultural services. This means that there is literature that delves into the equity and sustainability of Singaporean public housing, but usually without linking it to land value capture. One exception is Fainstein (2012), who wrote on the (in)justice of the leasehold system and land acquisition policy in Singapore.

This lack of literature on the sustainable performance of land value capture is also acknowledged by Kresse and Van der Krabben (2021). They argue that the sustainability is disregarded in the current debate on public policy. In addition, they mention that most research on tends to focus on Western economies, specifically in the Anglo-Saxon context. Kresse's wider work can be characterized by his attempts to close this research gap of land value capture in relation to sustainability and developing economies. In his first publication in this series of articles, he set out to clarify how value capture policies work in countries at different development stages (Kresse et al., 2020). He found that more mature economies enjoy a greater trust and better power relations, rewarding them higher public negotiating positions. This allows them to justify value capture policies with different rationales (see Chapter 2.1). Developing countries that do not enjoy this privilege seem to be limited in their implementation of land value capture policies. Therefore, it is important to consider the development stage of a country when implementing LVC.

Kresse and Van der Krabben (2021) also studied the ecological performance of land readjustment projects in South Korea and Taiwan that were conducted during periods of rapid urbanisation. Land readjustment is a specific type of land value capture tool, just like public leasehold systems. It enables governments to redistribute the division of land plots in a certain area, and to assign landowners new plots and development rights (Alterman, 2012). The goal is to increase the land value in that area through a more efficient use. The government can use part of the land value increments to finance infrastructure and amenities. Kresse and Van der Krabben found that land readjustment projects in Korea and

Taiwan have successfully dealt with fiscal stress and rapid urbanisation in times of reconstruction after World War II. However, the projects were less successful when examined through the lens of sustainability. There was a lack of concern for the local ecosystem which resulted in the ecological costs of greenfield developments being often neglected. Additionally, construction on brownfield sites was often avoided. The government's weak negotiation position also resulted in ecologically inefficient urban patterns. This is because only a minimal amount of land was assigned to the public network to keep developer obligations low and to maintain the landowners' support.

Kresse's work greatly inspired the topic of this thesis. Kresse and Van der Krabben (2021) call for additional research on public policy interventions in countries that face rapid urbanisation. Specifically, among others, on the implementation of more effective value capture mechanisms. This thesis is a response to this request and aims fill this knowledge gap by assessing the cases of Singapore and Hong Kong, two cities that implemented an alternative type of value capture.

1.4 Social relevance

This research is socially relevant, as it touches on a variety of issues, namely: rapid urbanisation, and tools to finance public projects (land value capture through public leaseholds), and equity and sustainability. It is estimated that by 2050 two-thirds of the world's population will live in cities. China's urban population alone is expected to reach nearly one billion by 2030. Rapid urban population growth is also anticipated in other fast-growing economies, such as India, Nigeria and Indonesia. If managed well, urban growth has the potential to bring substantial human and economic development benefits to millions of people (Floater et al., 2017). However, as mentioned before, more than one trillion U.S. Dollar is missing each year for urban investments, greatly limiting cities' greening efforts. This investment gap is especially severe in developing economies due to their budget constraints (CCFLA, 2017).

Therefore, the Paris Agreement, the UN Sustainable Development Goals, and UN Habitat III New Urban Agenda all stress the need for a more effective use of both private and institutional capital for the investment in public infrastructure. While public investments into sustainable infrastructure and housing might be more costly upfront, they could generate savings long-term (Floater et al., 2017). Land value capture promises to overcome this financial problem, as it enables governments to capture increased property values resulting from public investments. This makes it a powerful tool for developing economies to finance public projects, such as public transport or housing (CCFLA, 2017; Floater et al., 2017).

It could be argued that the social relevance of this research also stems from the same issue as the scientific relevance, namely the knowledge gap. Land value capture is promoted as a tool by a variety of institutions and researchers. However, little is known about the sustainable performance of different land value capture tools. A better understanding of how value capture can be implemented in an equitable and sustainable manner might also result in greater social outcomes. By learning from the cases of Singapore and Hong Kong, other cities can replicate the successes while avoiding the mistakes.

Equity and sustainability are also part of the social relevance. If public leasehold systems are to be implemented to finance sustainable urban development, they should also be in line with the Sustainable Development Goals to be truly sustainable. For example, some equity concerns are observed in Singapore. While being a democratic country, Singapore's development since its independence was based on an authoritarian decision-making process that disregarded landowners in favour of the public. Landowners were often poorly compensated for land acquisitions by the government (Fainstein, 2012). Instances like this reinforce the importance of equitable practices when implementing a public leasehold system. Additionally, if cities are to capture the human and economic development benefits of urban growth while minimising the (social) costs, they will need to follow a sustainable growth pattern. Urban development should be founded on good urban design, effective legislation and regulation, and sufficient financing (Floater et al., 2017). Thus, sustainability is an essential aspect of successful urban development.

2 Literature review and theoretical framework

In this chapter, the literature review is presented. First, land value capture is defined. Three sets of value capture instruments can be distinguished, one of which is characteristic for Singapore and Hong Kong: the public leasehold system. Then, the period of rapid urbanisation is defined for both cities, which will serve as the timeframe for this research. Afterwards, the definitions of equity and sustainability that are used in this research are provided. This theoretical framework is followed by the analytical framework that will be used for the assessment of the public leasehold systems. I will argue the choice for the specific frameworks.

2.1 Land value capture

According to the OECD and the Lincoln Institute of Land Policy (2022), land value capture is "a policy approach that enables communities to recover and reinvest land value increases that result from public investment and government actions" (p.14). It is rooted in the idea that public action should generate public benefit. When used in conjunction with the principles of good governance and urban planning, land value capture can be an integral tool for achieving positive fiscal, social, and environmental outcomes (OECD & Lincoln Institute of Land Policy, 2022). Additionally, this approach is deemed efficient and equitable. Efficient, since beneficiaries of public infrastructure are required to pay part of the investment costs. Equitable, since landowners who did not contribute to land value increases do not retain the financial benefits. Recovering these unearned increments means that the government has more money to fund public infrastructure (Ingram & Hong, 2012). An alternative definition for land value capture is proposed by Hui et al. (2004). They state that land value capture is the collection of all kinds of taxes by the government derived from land and its attached property. However, I find this definition to be too narrow, as it leaves out the recovering of public investments. Therefore, in this research, land value capture refers to the OECD definition.

There is a variety of instruments that allow governments to recover land increments. Alterman (2012) distinguishes three sets of value capture instruments, namely: (1) macro, (2) direct and (3) indirect instruments. Macro policy includes the replacement of private property by long-term public leaseholds. It also includes land banking, land readjustment and the nationalisation of all land and direct government control over its use. This last instrument was the trademark of many socialist regimes. Following macro instruments, direct value capture instruments seek to capture value rise under the explicit rational that the landowner did not contribute to the value increase. Indirect value capture instruments, on the other hand, only seek to generate revenues for specific public services. Indirect instruments are less ideological and more pragmatic than the macro and direct instruments.

The instrument most relevant to this study is the replacement private freehold rights by a system of long-term government leaseholds. After the collapse of most socialist regimes, this instrument also became less prominent. Now, public leaseholds are only used on a limited scale. However, as mentioned before, two successful exceptions are Hong Kong and Singapore. These two city-states managed to capture much of the land value increments using their public leasehold systems (Alterman, 2012; Hui et al., 2004). Other notable examples include the Australian capital of Canberra and the Dutch capital of Amsterdam. Canberra uses the public leasehold system to obtain low-cost land for building (Archer, 1977; HDB, 2024; Hong, 1999). Amsterdam uses it to subsidise social accommodations (such as social housing, hospitals etc.) and to maintain control over land-use (Fainstein, 2012). Still, Singapore and Hong Kong take this approach much further than the other two examples. The public leasehold system played a key role during the rapid development of these two cities during the twentieth century. The following paragraph will define the period of rapid urbanisation in Singapore and Hong Kong. The rules and regulations that make up the public leasehold systems of both cities are further explored in Chapter 5.

2.2 The periods of rapid urbanisation

For this study to be relevant to developing countries today, it is important to define when Singapore and Hong Kong experienced their periods of rapid urbanisation. For the case of Hong Kong, Wu et al. (2023) researched the driving mechanism of urban construction land. They explain that the Hong Kongese urbanisation process began in 1842, when the British set up a trading port on the island. As the population grew and the living environment declined, development of new towns became important. In 1960, the British Hong Kong government began planning the development of new towns, and construction began in 1970. That same year, the Ten-Year Housing programme was adopted. This programme set the goal to construct affordable housing for 1.8 million people between 1973 and 1983, all of which had to be realised in the new towns. For Wu et al. (2023), this marked the beginning of extensive new town development, and as such, they marked 1972 as the initial year for their study. They also conclude that the growth period was mainly from 1972 to 2010, after which growth of construction land slowed down.

However, Hong Kong had already developed to a first world city by 2010, and this research focusses on developing countries. By looking at economic growth, the period rapid urbanisation can be defined more sharply. Singapore and Hong Kong are part of the so-called “Four Asian Tigers”, a group of countries which have experienced a period of rapid economic growth over the second half of the twentieth century. The other two Tigers are South Korea and Taiwan. According to Toma (2019), the “golden years” of high economic growth in Singapore and Hong Kong were in the period 1960 to 1990. Their economic growth reached around 6% per year in the period 1960-1995 (Barro, 1998). Based on this, Singapore’s period of rapid growth is defined in this research to be from 1960 to 1990. Moreover, new land value capture instruments were introduced in Singapore during the 1990s (OECD & Lincoln Institute of Land Policy, 2022). For the purpose of this paper, this change in policy marks the end of the period of rapid ubication. In the case of Hong Kong, the period is defined as 1970 to 1997, the year that Hong Kong was handed over to China. This transition also marked a change in policy and is therefore used in this paper to mark the end of rapid urbanisation (OECD & Lincoln Institute of Land Policy, 2022).

2.3 Defining equity and sustainability

As this research aims to answer the question how equitable and sustainable the public leasehold systems are, it is important to define what is understood by these concepts. Starting with equity, Brand (2015) sets out in her paper to formulate a definition of equity for the twenty-first century. Her analysis starts with Krumholz and other equity planners from the 1970s and 1980s. According to these planners, the goal of equity is to advocate for those unrepresented in urban development policies, and to centre planning on redistributive efforts. Fainstein (2010) has a similar focus on equity and defines it as “a distribution of both material and nonmaterial benefits derived from public policy that does not favour those who are already better off at the beginning” (p. 36). Brand (2015) concludes that equity in the twenty-first century must not only focus on redistribution, like Krumholz’s and Fainstein’s definitions, but also on how privileged democratic voices can push for inequitable urban development. This will be de definition of equity in this research.

Regarding sustainability, the definition used in this research follows the original 1987 Brundtland definition of “meeting the needs of the present without compromising the ability of future generations to meet their own needs.” Though perhaps outside of the scope of this research, it should be noted that this definition and its translation into SDGs is rather anthropocentric (Visseren-Hamakers, 2020). Indeed, the analytical framework used for this research also does not address non-human animals. However, this is a shortcoming I’m willing to disregard in favour of LEED ND. Like the Brundtland definition, LEED ND serves as a standard that allows for easy comparison between this study and other studies using this same method.

2.4 New Urban Agenda

The previous paragraphs provided definitions to a variety of concepts. In order to ground this research, a theoretical framework is needed that can combine them. The aim of this paper is to evaluate how the public leasehold systems of Singapore and Hong Kong have been implemented in terms of spatial arrangements and its impact on the social outcomes, i.e. equity and sustainability. The UN-Habitat (2018) proposed a framework for sustainable urban development that can serve this purpose. This framework was published in the New Urban Agenda and consists of five main pillars which together form the foundation for sustainable urban development. In short, these pillars are national urban policies (NUPs), urban legislation and regulations, urban planning and design, local economy and municipal finance, and local implementation. Clos (2016) defines these pillars as follows:

National urban policies (NUPs). NUPs must promote urban development that is effective, regardless of available capacity and resources. NUPs promote a better layout and are built on three foundations: (1) good urban design; (2) effective legislation and regulation; and (3) financial plans and that promote inclusion and sustainable urban development over the long term.

Urban legislation and regulations. Good governance is essential for sustainable urban development, as it is a prerequisite for resilient services and social, institutional, and economic activity in cities. Rules and regulations, and the ability to enforce these, are thus needed to guarantee that planned urbanisation is carried out. Additionally, urban legislation and regulations enable inclusive governance, allowing the voices of marginalized citizens to be heard in decision-making.

Urban planning and design. “Good urban planning and design promotes compact, efficient, and people-oriented cities, which are integrated, well-connected, and equitable” (Clos, 2016, p. 247). Good urban plans are a prerequisite for urban resilience. They promote environmental sustainability, access to essential services and jobs, and the availability of public space. Urban plans require governments to pro-actively plan well-connected networks of streets, public space and infrastructure. Simultaneously, construction in high risk or vulnerable areas should be prevented. This pillar requires sound rules and regulations that incentives the adherence to building codes.

Local economy and municipal finance. This pillar stresses the role of good urbanisation in improving a city’s competitiveness. By providing a spatial layout that allows businesses to grow and develop, opportunities and access to wealth and jobs increases. This reenforces the local economy. On the other hand, municipal finance can use the value generated by urbanisation to sustainably finance the costs of urbanisation. By capturing land value increases, the wealth can be expanded and shared by investing in increasingly higher quality urbanisation. Through sustainable finance and a sufficient flow of resources a virtuous financial cycle can be created.

Local (physical) implementation. This pillar deals with all types of urban development: city extensions, regeneration projects, the realisation of services etc. It concerns the physical implementation of the plans. The developments should be based on realistic business and investment plans. Additionally, they must take into account infrastructure on national, regional and local levels, as different layers of government do not always share the same priorities.

Figure 2.1 The five pillars for sustainable urban development proposed by the New Urban Agenda (UN-Habitat, 2018) (author's work)

Describing these five concepts as pillars that hold up sustainable urban development results in a framework as shown in Figure 2.1. This figure illustrates why I found the need to rework the framework that the UN-Habitat (2018) proposed. The “pillars” provide useful definitions; however, this figure of speech does not do justice to the relation between each “pillar”. For example, local implementation is the result of the other “pillars” and can therefore not stand on its own. If anything, the other pillars serve as the foundation for local implementation. As such, this framework for sustainable urban development by the UN-Habitat (2018) is rather a collection of principles. In its current form, it is not a practical framework to evaluate the Singaporean and Hong Kongese public leasehold systems. Nevertheless, it can be adapted into a conceptual model of urban development that does serve the evaluation. Fortunately, this is done by representing the relations between each pillar as described in the definitions provided by Clos (2016). This conceptual model is presented in Figure 2.2.

To start off, it should be noted that Singapore is a city-state and Hong Kong has never been independent. Therefore, “national” urban policy must be taken with a grain of salt. In the conceptual model, NUPs is therefore represented plainly as “urban policies”. Secondly, Clos’ (2016) definition of NUPs suggests a hierarchy among the five pillars. According to him, NUPs are founded on i) urban design; ii) legislation and regulation; and iii) financial plans. On closer inspection, these three factors seem to correspond the pillars of urban legislation and regulations, urban planning and design, and local economy and municipal finance. Therefore, these three pillars from the original framework are grouped together in the conceptual model as variables under the header “Urban policies”. For the sake of simplicity, the names of these three variables have been shortened.

These three variables come together in the local implementation, where planned urbanisation is physically realised. In the case of this research, local implementation refers to the new towns that were realised under the public leasehold system. The variable of “sustainable urban development” that is part of Figure 2.1 is omitted in the conceptual model. This is because the concept of sustainability is not inherent in urban development, but rather a description of the quality (albeit desired). For example, urban planning and design can be sustainable, but it does not have to be so. If it is not, the hypothesis is that the resulting physical implementation is also not sustainable. So, whether the local implementation is sustainable or not depends on the variables under urban policies.

Now that the theoretical framework for sustainable urban development is conceptualised, an analytical framework is needed to assess the local implementation, i.e. the new towns of Singapore and Hong Kong. LEED ND was selected for this purpose. The next paragraph delves deeper into this assessment framework.

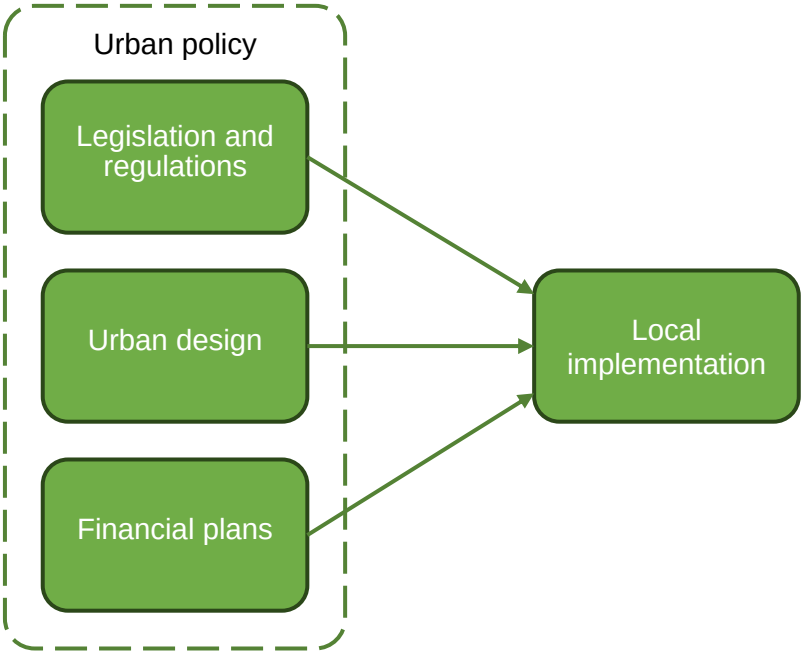

Figure 2.2 A theoretical framework for urban development (author's work)

2.5 LEED ND

An analytical framework is needed to measure the sustainability of the Singaporean and Hong Kongese new towns. LEED ND is a well-recognised rating system for evaluating sustainable neighbourhood development in North America. The Leadership in Energy and Environmental Design for Neighborhood Development (LEED ND) is developed by the U.S. Green Building Council and is based on “green building” principles (Szibbo, 2015). It has been developed to extend sustainability certification to the neighbourhood-level (Talen et al., 2013). Other LEED rating systems focus primarily on green building practices of individual buildings. LEED ND, however, also focuses on the infrastructure that brings buildings together into a neighbourhood (Sharifi & Murayama, 2013). This makes it well suited to study the new towns developed in Singapore and Hong Kong.

LEED ND is designed on a definition of sustainability that consists of three pillars: equity, economy and environment (Szibbo, 2015). In order to measure sustainability, LEED ND uses several commonly used metrics for urban assessment, such as accessibility, density, and land-use diversity. Neighbourhoods that perform well enjoy greatly reduced energy consumption and greenhouse gas emissions. Additionally, they produce savings in stormwater runoff, water use, and land consumption (Talen et al., 2013). However, some researchers argue that LEED ND does not sufficiently support social equity (Boeing, 2014; Szibbo, 2015). Diaz-Sarachaga et al. (2018) studied the effectiveness of LEED ND to assess urban development in poorer nations. They found that the framework shows significant bias towards environmental aspects at the expense of social matters. The framework is therefore not well-suited to measure equity. Nevertheless, LEED ND serves well to assess local implementation of the new towns. It can indicate what was done well and what could be improved. As the LEED ND analysis would be too superficial by itself, the assessment is deepened by an evaluation of how (1) the rules and regulations, (2) the urban design, and (3) financial plans came together. The evaluation will be done in the form of a literature review, which also allows me to further investigate the equity of the public leasehold systems.

3 Methodology

This chapter provides an outline of the philosophical foundation of the research, as well as the specific methodological choices that were made. The first paragraph delves into the research strategy. Different strategies are explored, with the case study coming out on top. After the strategy is clarified, the methods for data collection are explained. Finally, the validity of the research is reviewed.

3.1 Research strategy

Van Thiel (2014) distinguishes four main research strategies: namely, the experiment, the survey, the case study, and desk research. Of these strategies, the experiment is the least suitable for this research. Experiments in the realm of public administration mostly consist of games and simulations (Van Thiel, 2014). Neither of these were applied, so this strategy can be disregarded. However, the other three strategies are worth exploring.

According to van Thiel (2014), the survey involves standardised forms of measurement. Usually, it involves several variables and many units of study, i.e. the respondents. This allows for efficient data collection on a large scale. Additionally, data can be easily generalised, resulting in a high level of external validity. On the other hand, standardisation will also result in a certain superficiality to the data collected. In her book, Van Thiel mainly focuses on surveys involving respondents. However, using the definition she provides, it can be argued that the LEED ND rating system could be used as a survey. It is also a standardised measurement that could involve many units of study. Nevertheless, this research does not seek to analyse a large number of cases. Since scale is one of the main characteristics of the survey strategy, the research strategy cannot be defined as a survey.

The desk research strategy is characterised by its use of existing data sources. This differentiates it from the survey, which is always meant for the collection of new data (Van Thiel, 2014). I did not to travel to Singapore and Hong Kong to conduct my research. Rather, I gathered existing data from behind my computer. Still, using the internet and Google Street View, I can gather observations from halfway across the globe that are relevant for the LEED ND rating system. Therefore, the term ‘desk research’ is rather misleading since I did gather new information. This disqualifies desk research as the main approach for this research. Nevertheless, desk research is still partially relevant, namely for the use of existing literature and data for the LEED ND analysis.

This leaves us the case study approach. This strategy is characterised by the collection of different methods that are used to collect and analyse data. This allows for an in-depth understanding of a case (Creswell & Poth, 2018). As Thomas and Myers (2015) state, “Your case study is defined not so much by the methods that you are using to do the study, but the edges you put around the case” (p. 21). A case can be almost anything, even a neighbourhood (Van Thiel, 2014). In this research, the cases are the new towns of Singapore and Hong Kong. Additionally, a typical case study gathers a large body of mainly qualitative data on everything that has to do with the case (Van Thiel, 2014). It is for these reasons that the case study strategy was chosen for this research. It is sometimes argued that case study research is a design rather than an strategy (Stake, 2005; Thomas & Myers, 2015). However, since this is a matter of personal preference, I choose to see it as a strategy.

In summary, the research strategy is defined as a qualitative case study of the performance of public leasehold policies, through the lens of LEED ND, to understand the ecological and social performance of these policies in selected neighbourhoods in Singapore and Hong Kong. The methods for data collection and analysis within this case study will be explained in the next paragraph.

3.2 Data collection and analysis

As mentioned before, the aim of this research is to understand how policy decisions influenced the urban form in Singapore and Hong Kong. Therefore, it is essential to assess the social and sustainable performance of the physical form of their new towns. As explained in the previous chapter, this is done using the LEED ND rating system. The rating system guides the collection and analysis of data through its various credits. Moreover, it is important to look into the policy decisions themselves to see how land value capture was embedded in their land policy. This was done through a literature review. The next section explains which cases were selected.

3.2.1 Selection of cases

The selection of cases (i.e. new towns) is based on the following reasoning: first, a timeframe was selected. This is where previously defined the periods of rapid urbanisation come into play. Hong Kong started developing new towns in the 1970s, while Singapore already started in the 60s. The period of rapid urbanisation in Singapore as defined in this research ends in 1990, while Hong Kong's ends in 1997 (see Paragraph 2.2). These two periods have two decades of overlap. Of these two decades, the first decade sits closest to the beginning of the period of rapid urbanisation in the two cities. Therefore, new towns were selected that were constructed in the 1970s. Selecting cases from one decade minimises variations in the period of construction, presumably making them better comparable.

Then, a generation of new towns was selected. Both Singapore and Hong Kong specify 'generations' of new towns. The Hong Kongese government has developed three generations of new towns since 1973. The first generation started work in the early 1970s and consists of Tsuen Wan, Sha Tin and Tuen Mun (GovHK, 2016). In the case of Singapore, the generations are less pronounced. Hee and Ooi (2003) define multiple 'stages' of new town development in Singapore and state that the third stage started in 1973 with the development of Ang Mo Kio. Third stage new towns are based on a prototype design, while previous new towns were not. This creates a natural separation from previous new towns. Other third stage new towns are Bedok and Clementi. Together, these three new towns were the focus of the HDB's fourth five-year building programme (Soh, 2021).

Thus, the analysis covers six new towns, three in Singapore (Ang Mo Kio, Bedok, Clementi) and three in Hong Kong (Tsuen Wan, Sha Tin, Tuen Mun). These six represent a complete generation of new towns in both cities. As such, the selections should provide a complete and representative picture of those generations. Moreover, by selecting cases from one generation or one stage, the link between land policy and the physical form can be better understood. This is because each stage or generation is defined by their similar land policies, and new stages emerge when policies are adapted. This is also illustrated in the works by Hee and Ooi (2003) and GovHK (2016).

The selected cases are shown in Figures 3.1 and 3.2 below. Some demographic data is presented in Table 3.1. Please note the following: the areas on the maps represent (modern-day) administrative divisions. In the case of Singapore, the original new towns are smaller than the administrative divisions that they are part of today. These divisions also include estates that were constructed after the eighties. This inflates the data in Table 3.1. In the case of Hong Kong, the built-up areas are concentrated on a much smaller area in the valleys between the mountains. This means that (local) population densities are in reality much higher than what is presented in the table below. These discrepancies are accounted for in the analysis. The figures serve to provide a quick overview of where the new towns are situated. Please note that Hong Kongese new towns have much larger populations, bigger land areas, and greater densities.

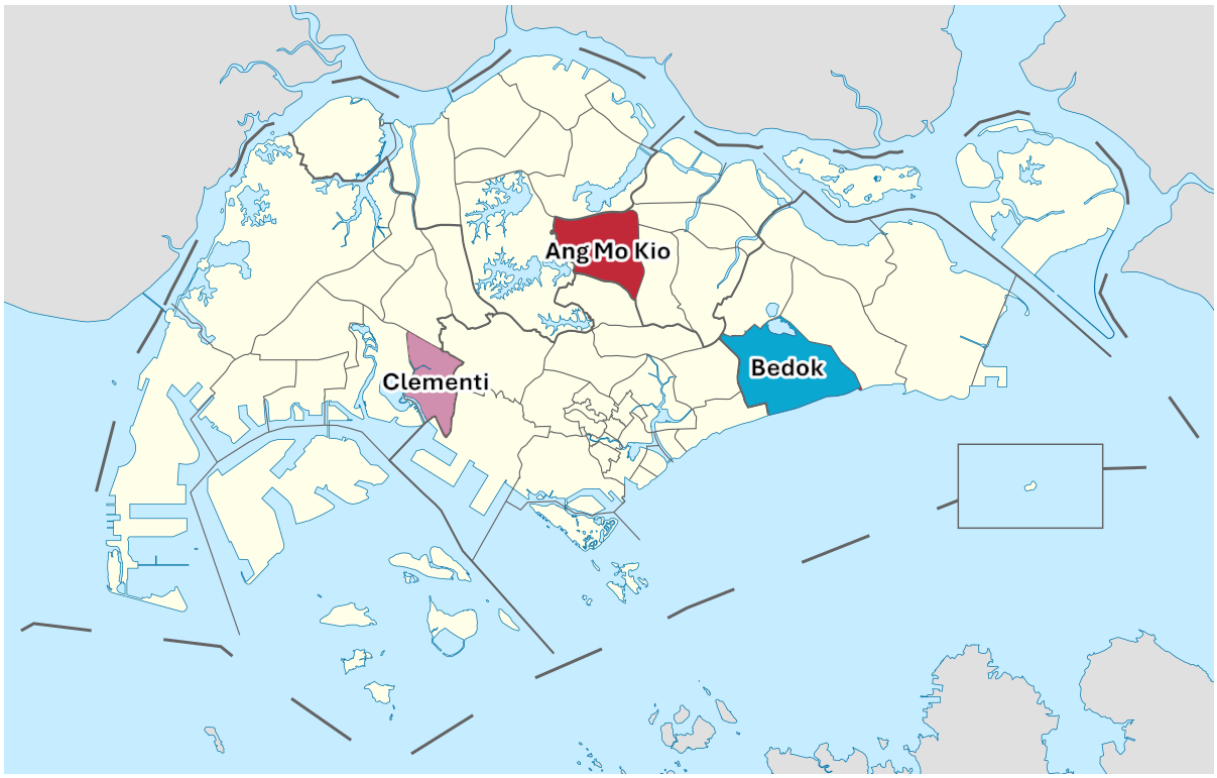

Figure 3.1 The selected Singaporean new towns (author's work)

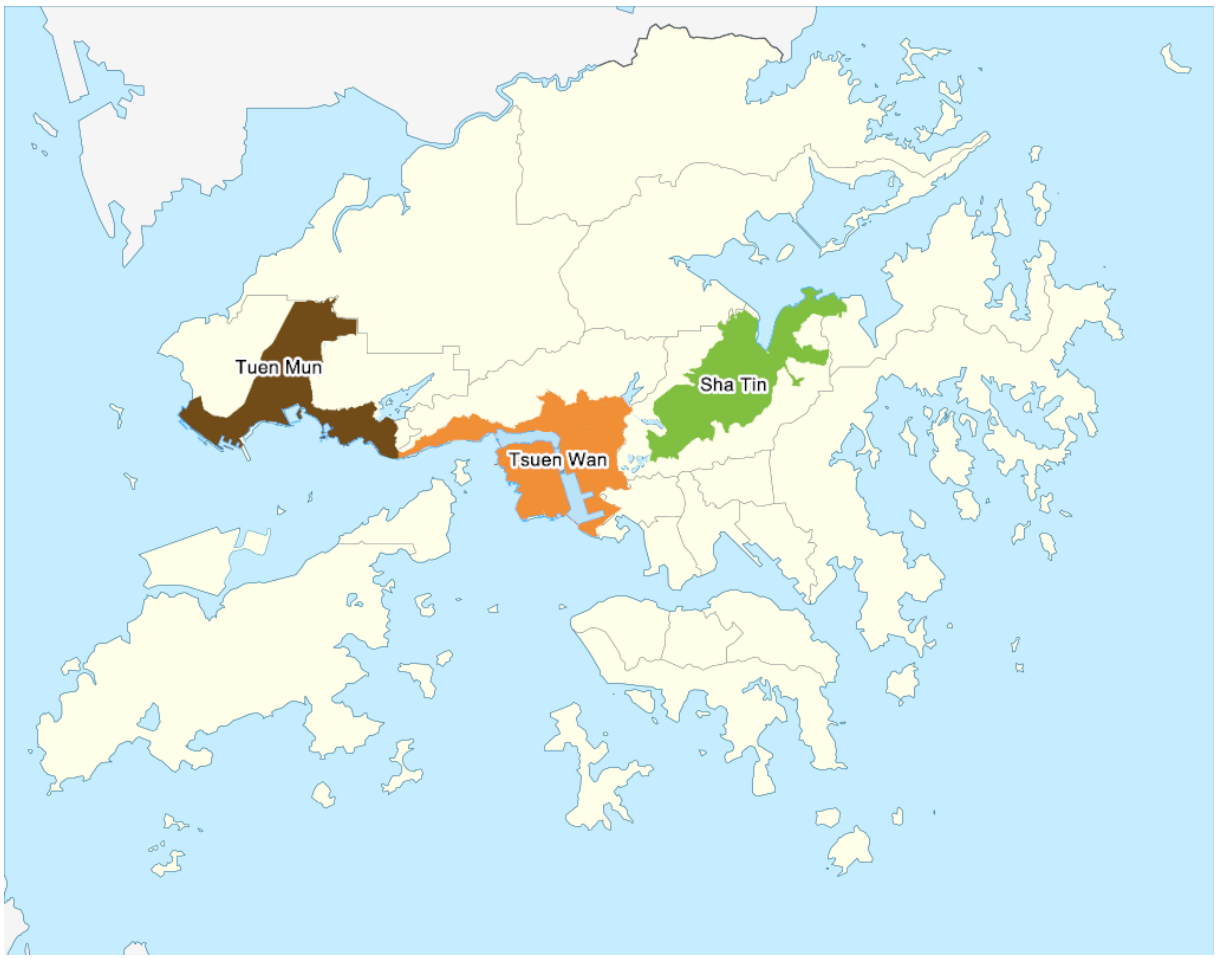

Figure 3.2 The selected Hong Kongese new towns (author's work)

City	Name	Population	Area (km^2)	Density (/km^2)
Singapore	Ang Mo Kio	162,280	13,9	11,639
	Bedok	276,990	21,7	12,777
	Clementi	91,990	9,4	9,776
Hong Kong	Tsuen Wan	800,415	45,9	14,438
	Sha Tin	487,724	28,2	17,295
	Tuen Mun	501,491	32,6	15,383

Table 3.1 Sizes of the elected new towns (Brinkhoff, n.d.)

3.2.2 LEED ND data collection and analysis

The LEED ND rating system is divided into several categories (Szibbo, 2015). This research will only use the categories Smart Location and Linkage (SLL) and Neighbourhood Pattern and Design (NPD). Each category is subdivided into credits. SLL contains nine different credits which can reward 27 points in total. NPD contains fifteen credits which can reward a total of 44 points. In total, a neighbourhood can be rewarded 71 points. Additionally, the SLL and NPD categories contain five and three prerequisites respectively (USGBC, 2018). Normally, projects must fulfil all prerequisites in order to be eligible for LEED ND certification. In this research, however, the prerequisites are used as yet another element to compare the neighbourhoods (or in this case: new towns). The LEED ND approach was chosen for its familiarity with the researcher. Additionally, it allows for the comparison of different new towns, as the framework makes us of relative dimensions (such as intersections/km^2 etc.) (Kresse & Van der Krabben, 2021).

Each credit specifies which data needs to be collected to assess the new town. For example, the NPD credit for tree-lined and shaded streetscapes specifies the amount of shade that needs to be provided to be rewarded a point. The relevant data is collected from a variety of sources, such as Google Street View, official government statistics and scientific literature. Where the LEED ND framework was either lacking, unclear or unapplicable, the spirit of the credit was interpreted and applied. These cases are discussed in chapter 6. For the data collection, not every single street is analysed. Instead, three representative types of streets (main road, secondary street, tertiary street) are picked and analysed. Where complete information cannot be obtained, educated estimates are made. In the case of Singapore, building heights were calculated by counting floors, using 3.5 metres as the average floor height. For Hong Kong, a dataset by Esri China (HK) (2024) was used. Land uses were approximated based on different maps. For some credits, scientific literature was used to provide a reliable basis for the estimates, especially in the case of government policy (or the lack thereof).

Data analysis was done by following the LEED ND framework. Each credit specifies the metric that must be used to assess the performance of the new towns. If a new town performs well, it gets rewarded more points. For example, to minimise the impact of urban development on protected farmland and wildlife habitat (among other issues), LEED ND encourages compact development. The metric for this credit is the number of dwelling units per hectare. A higher density rewards more points. This example illustrates how LEED ND operationalises certain ecological concerns. Moreover, LEED ND states that compact development improves public health by encouraging physical activity, which tackles social concerns. Other credits apply other metrics. The assessment is sometimes as simple as counting uses (e.g. a retail, residential, public library etc.) or establishing whether a certain policy exists or not (e.g. a policy on public participation). However, sometimes it entails a combination of different data sets that come together to form a satisfactory estimate (e.g. the diversity of housing types in a new town). In Hong Kong, especially, data on densities and flat sizes was difficult to come by. However, scores could always be approximated using different data sources. Once the assessment for each new town is down, their performances can be compared by looking at their scores for each credit.

In order to visualise the scores, Kresse and Van der Krabben (2021) developed a new graphic representation of the LEED ND credits. Their visualisation is both neat and

compact. However, I also found that their visualisation was distorted by the dramatically different sizes of the credits, which is an inherent part of the LEED ND framework. Where some credits only reward one point, the largest credit rewards ten. In this research, the graphic visualisation of data was further developed to overcome this problem.

The use of LEED ND in this research serves to assess the performance of the urban form. While the urban form (local implementation) is the result of urban policy, the policies themselves are not necessarily explored in the LEED ND framework. Therefore, the assessment is complemented by a literature review that delves deeper into the Singaporean and Hong Kongese urban policies, including their public leasehold systems. This literature review should explain how policy decisions influenced the physical urban form and its social and ecological performance. The literature review also serves to shine a light on the social performance, since we previously established that LEED ND lacks in this department (Diaz-Sarachaga et al., 2018). The literature review is structured on the framework for sustainable urban development by the UN-Habitat (2018).

3.3 Validity and Reliability of the Research

Case studies deserve special attention when it comes to their reliability and validity (Van Thiel, 2014). This is because the small number of units of study (in this case only six) can compromise the reliability and validity. Case study findings are usually unique or only applicable to the particular case, which limits the external validity of case studies. On the other hand, the internal validity tends to be much greater, due to the depth of information gathered. Fortunately, the use of LEED ND ensures that the research could be easily replicated for other cases. The rating system exhibits survey-like characteristics, as it involves a standardised form of measurement. This means findings are easily compared to both existing LEED ND research (such as Kresse's and Van der Krabben's (2021)) and future LEED ND research (into other new towns or other cities). This increases the external validity. Finally, as previously mentioned, the framework shows significant bias towards environmental issues at the expense of social matters (Diaz-Sarachaga et al., 2018). This negatively impacts the validity of this research. However, I take this shortcoming for granted in favour of the use of a standardised format. Additionally, this fault is partially resolved by using a literature review.

The reliability of this research could have been further increased using expert interviews. They would have allowed for additional triangulation of the findings. However, I chose not to conduct interviews in order to preserve the scale of the research. To make interviews a meaningful part of this research, a significant number would have needed to be conducted. I decided that doing a comprehensive literature review would yield more insights and information within the available time. Moreover, I also decided against limiting the number of interviews to one or two. A smaller number of interviews would have been feasible. However, in my consideration I came to the conclusion that the interview(s) would primarily serve as an exploration of the topic. In my opinion, discussions with my supervisor have already fulfilled that role. Especially since my supervisor, Kresse, is one of the experts in the field of land value capture. Ultimately, the decision was driven by time constraints and the consideration of the amount of work that already went into this research.

4 LEED ND Results

This chapter presents and discusses the results from the LEED ND analysis. The figures at the end of this chapter provide an overview of the Smart Location and Linkage (SLL) and Neighbourhood Pattern and Design (NPD) scores for each new town, as well as the maximum possible score per category. All new towns seem to score highly on categories related to amenities and density, while performing poorer in ecological and communal aspects. Variation between cities seems to be greater than the variation between the new towns from those cities. Overall, Hong Kongese new towns perform equal to or poorer than Singaporean new towns, except for the category Compact Development, which is related to population density. That new towns score similarly within each city is sometimes due to city-wide policies, as they influence each new town equally. The rest of this chapter provides a more detailed description of the scores and what they mean.

The full evidence for the SLL and NPD scores is available in a separate dataset which also includes all references to the data that was collected. Numerous maps, calculation, tables and estimates were made using a wide range of sources. Including all this information in this paper would proof to be too much. Rather, this chapter explores the LEED ND results and informs the reader about important findings and considerations. When statements are made, references are included. These are the same as the ones used for the LEED ND analysis. A selection of figures is included in this chapter to provide the reader with an insight into the analysis. However, the selection is not exhaustive. The reader may assume that each figure or picture has a counterpart for each of the other neighbourhoods under study in this paper. All figures can be found in the full dataset.

4.1 Smart Location and Linkage

Before discussing the results, it is important to understand what SLL tries to achieve. Especially since sometimes the spirit of a credit or prerequisite needs to be interpreted to come up with a suitable score, for example when only proxy data is available. The aim of SLL is the selection of sites that minimise urban sprawl and the adverse environmental effects that come with it. It promotes development within and around existing communities and public transit infrastructure. This approach favours the enhancement and redevelopment of current neighbourhoods, suburbs and towns, while limiting urban sprawl and the adverse environmental effects that come with it. In doing so, the number of vehicle trips and the distances travelled by vehicles are reduced. Additionally, this strategy seeks to lower the incidence of obesity, heart disease, and hypertension by encouraging daily physical activity through walking and cycling (USGBC, n.d.). The following paragraph will discuss the results.

SLL prerequisites

There are five prerequisites that new towns must meet in order to get their LEED ND certification. The first one, Smart Location, determines the type of development. This can be a brownfield development, an infill project, or a development located on a transit corridor. Greenfield developments do not qualify for this prerequisite, unless they are adjacent to existing neighbourhoods. The definitions of “adjacent” and “infill” leave ample room for interpretation. “Adjacent” means that a quarter of the project’s boundary is lined with parcels that are previously developed. Boundaries that border a water body are exempted. For a project to be characterised as infill, 75% of their boundaries must border previously developed sites. There are some additional requirements for size and connectivity of the bordering neighbourhoods. Since LEED ND does not prescribe an upper limit to the scale of the development, Ang Mo Kio, Bedok, and Clementi all fall under one of these categories, despite the sites being upwards of 350 ha. Tsuen Wan, Sha Tin and Tuen Mun, on the other hand, have been classified as located on a transit corridor. The development of these new towns coincided with the development of an extensive rail network called the MTR that connects them to the rest of the island (GovHK, 2016). Therefore, all six new towns fulfil this prerequisite.

The remaining four prerequisites are all related to ecosystems and open space. Starting with Agricultural Land Conservation, all new towns satisfy this prerequisite. The aim is to preserve agricultural resources by protecting them from development. Projects must be located outside agricultural preservation districts. However, the existence of agricultural preservation measures in both cities could not be verified for the time of development of the new towns. Therefore, assuming there is no preservation area, they all comply with the prerequisite. Similarly, for Imperilled Species and Ecological Communities Conservation, no information could be found on conservation plans. This is probably because in the 60s and 70s, conservation did not feature highly, if at all, in the Singaporean national agenda (Chang & Yeoh, 1999). However, according to the prerequisite, a biological survey is required to determine that no imperilled species or ecological communities are found on the site. Due to the absence of this information, it cannot be determined that this is indeed the case. In addition, no plans could be found that sought to restore lost habitats within boundaries of the new towns. Thus, all six new towns under study fail this prerequisite.

Lastly, Wetland and Water Body Conservation, and Floodplain Avoidance both concern water issues. An official map by PUB (n.d.), Singapore's national water agency, shows the flood prone areas of the 1970s and today (see figure below). While parts of the modern-day planning zones were prone to floods in the 1970s, the sites on which the original new towns were developed were not. So, Singaporean new towns also satisfy this prerequisite. For mountainous Hong Kong, however, Van Dijk and Weitkamp (2018) and Hui et al. (2024) describe how flood plains were the cheapest building sites for the new towns. Additionally, land was reclaimed from the shallow bays to create even more building area. As a result, Hong Kongese new towns fail this prerequisite. An official map of flood prone areas was not available for Hong Kong. The use of land reclamation also conflicts with Wetland and Water Body Conservation. In Singapore, land was reclaimed for the development of Clementi. Therefore, these four new towns fail this prerequisite. Bedok and Ang Mo Kio did not interfere with water bodies and hence satisfy the prerequisite. The results are summarised in the table below.

Figure 4.1 Map of flood prone areas of the 1970s and now in Singapore, altered to show the planning zones in pink (PUB, n.d.)

Prerequisite	Ang Mo Kio	Bedok	Clementi	Tsuen Wan	Sha Tin	Tuen Mun
Smart Location	✓	✓	✓	✓	✓	✓
Imperilled Species	✗	✗	✗	✗	✗	✗
Wetland / Water Body Conservation	✓	✓	✗	✗	✗	✗
Agricultural Land Conservation	✓	✓	✓	✓	✓	✓
Floodplain Avoidance	✓	✓	✓	✗	✗	✗

Table 4.1 Prerequisite scores for each new town (author's work)

SLL credits

SLL has six sets of credits. Starting with Location, this credit is made up of three options, the first one being location type. For this option, greenfield developments score no points, while infill sites can score the maximum. The Hong Kongese new towns of Sha Tin and Tuen Mun were developed mostly on reclaimed land near small villages. Tsuen Wan was developed from an existing town, but also partially sits on reclaimed land and a previously little developed island (see Figure 4.2). Consequently, the Hong Kongese new towns scored no points for this option, as they are considered to be green field developments. Singaporean new towns, on the other hand, did score some points. As previously discussed, due to the definitions of 'infill' and 'adjacent sites', Ang Mo Kio, Bedok, and Clementi scored 2 to 3 points for this option, despite the developments being upwards of 350 ha in size. The second option within this credit regards connectivity, for which the metric is the number of intersections per area. Here, the LEED ND manual contains a conversion-error that

increases the metric density by about four times relative to the imperial density (intersections per square mile). Nonetheless, even when accounting for this error the new towns do not meet the minimum density of about eighty intersections per square kilometre, resulting in zero points. Thirdly, the option for designated high-priority locations rewarded all new towns three points, since these locations were chosen by the government.

In the category Ecosystems and Open Spaces, all new towns performed poorly. They all showed problems regarding wetland and habitat conservation. No data could be found suggesting that there were plans in place for ecosystem conservation at the time of construction. Likewise, no plans could be found for nature restoration within the boundaries of the new towns. An honourable mention would be Bishan-Ang Mo Kio Park river restoration project, which is adjacent to Ang Mo Kio new town (Chan et al., 2023). Nonetheless, there were a variety of ecological problems, such as the loss of mangroves (see Figure 4.3), land reclamation (Van Dijk & Weitkamp, 2018), the absence of adequate sewage treatment facilities (Morton, 2009), and the decline of otter populations (Hui & Chan, 2024). Data from Gao et al. (2017) does seem to indicate Hong Kong did protect steep slopes. The Singaporean new towns do not have steep slopes. This is why both cities are rewarded one point for this category. Regarding Contaminated Sites, only Tsuen Wan was allegeable for points in this category, as other new towns were not constructed on brownfield sites. Chung et al. (2020) found that Tsuen Wan does contain some contamination. However, the scarcity and remoteness of the contamination minimises the impacts on the public. Therefore, Tsuen Wan was rewarded maximum points.

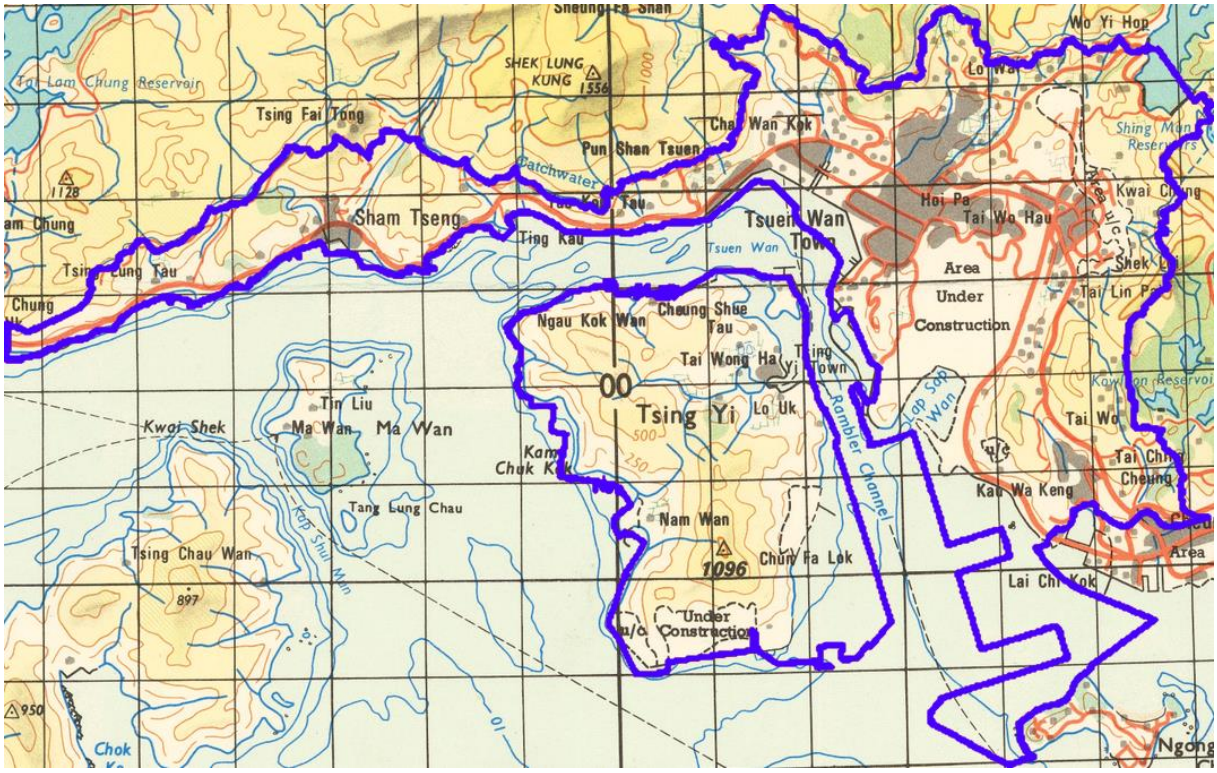

Figure 4.2 Map of Tsuen Wan from 1970 with its current new town border, adapted from Ministry of Defence (1970)

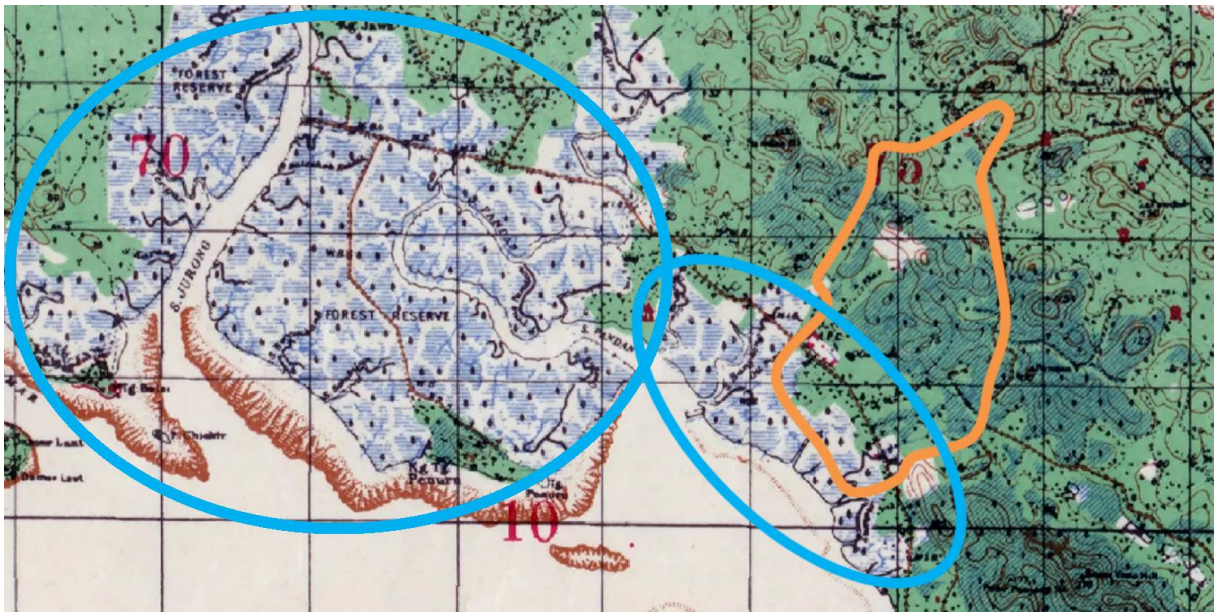

Figure 4.3 A map depicting the original mangrove forest (blue) and the outline of Clementi new town (orange), adapted from US Army (1943)

All new towns scored maximum points on Transit-Oriented Locations due to their access to mass rapid transit systems and their frequent service, in combination with the numerous bus stops. Likewise, Singaporean new towns scored highly on Cycling Facilities due to their existing and planned bike networks, with Clementi lacking slightly behind (LTA, 2024). Hong Kong showed more variety, with Sha Tin having the best cycling infrastructure, followed by Tuen Mun. Unfortunately, Tsuen Wan only has a disconnected bike route along the waterfront (Civil Engineering and Development Department, 2024). Plans for an expansion of the Hong Kongese cycling network from Tuen Mun to Tsuen Wan are not official yet.

Lastly, Jobs and Proximity is done well across the board. The new towns built in Singapore since the early 1970s are meant to be self-contained. There should be enough jobs in the new town for each household to find work (Liu et al., 1983). More digging was required to determine this criterium for Hong Kong. A study by He et al. (2020) suggests that most new towns have too few jobs for the population, with exceptions being Tsuen Wan and Sha Tin. To confirm this, I combined data on the number of persons engaged in industries other than civil service per new town (Census and Statistics Department, 2024) and population data from the latest census (Census and Statistics Department, 2021). From this I could estimate that there are indeed enough jobs in Tsuen Wan and Sha Tin to meet the LEED ND requirements. Tuen Mun, on the other hand, only has enough jobs for about half of the households. As such, it is the only new town that was rewarded no points, while the other scored maximum points. This is because both cities also provide enough affordable housing to meet the criteria. More on that in the next paragraph where the NPD categories are discussed.

4.2 Neighbourhood Pattern and Design

The second part of the LEED ND analysis concerns the neighbourhood pattern and design. NPD focuses on creating compact, walkable, mixed-use neighbourhoods with good connectivity to nearby communities. This should result in vibrant areas that offer a variety of benefits, including efficient land use, wildlife habitat conservation, and reduced urban sprawl. Compact development comes with a several of benefits. Residents enjoy easy access to shops, services, and public spaces. It promotes walking and bicycling, and reduces the distances travelled by car. Thirdly, it facilitates public transport, providing residents with a multitude of transportation options. NPD also promotes features like sidewalks, tree-shaded streets, and the availability of public spaces to encourage social interaction and physical activity. Diverse housing types and community involvement in planning ensure

neighbourhoods meet residents' needs (USGBC, n.d.). These aims are translated into prerequisites and credits, the results of which are discussed below.

NPD prerequisites

NPD has three prerequisites, which deal with walkable streets, compact development, and neighbourhood connections. The first one, Walkable Streets, is subdivided into four sub-requirements: public-facing entries, building-height-to-street-width ratio, sidewalks, and garage doors. Using OpenStreetMap and Google Street View, as well as some other auxiliary maps, it could be determined that the latter three requirements are satisfied for all new towns. Garage doors are mostly absent from the streetscape and sidewalks can be found along both sides of all streets that were reviewed. Due to the compact development and the use of high rises, buildings are tall enough to meet the minimum ratios. Some shorter buildings can be found, but LEED ND only prescribes 15% of the total block length to meet this requirement. Still, all three Singaporean new towns seem to fail this prerequisite, as can be seen in Table 4.2. This is due to the way buildings face the streets.

Ninety percent of new buildings must have a functional entry onto the circulation network. However, residential blocks in Singapore face tertiary streets that are separated from the circulation network by a barrier (see Figure 4.4). This is because there are parking lots in front of the apartment complexes that are not freely available to the public. Therefore, it can be debated whether the tertiary streets are part of the circulation network. It should be noted that only car traffic is restricted. There are multiple foot paths into the residential zones that do seem to be publicly available. Moreover, due to the configuration of the apartments, only a few buildings face the streets and roads that are accessible to the public. While the residential blocks line large parts of the streets and avenues, they are oriented perpendicular to them. There are also wide stretches of vegetation separating the buildings and avenues. For these reasons, I have decided to fail the Singaporean new towns for this prerequisite. More on the Singaporean street design can be found in Chapter 6.

The last two prerequisites are Compact Development, and Open and Connected Community. Both have credits under the same name that use the same method to determine the score. As such, I will elaborate on these in the next paragraph where I discuss the credits. Nevertheless, the first one is determined by the density of dwelling units, while the second one is determined by the density of intersections. All six new towns are dense enough to easily satisfy the prerequisite for compact development. On the other hand, the new towns do fail at connectivity since their intersection densities are too low. The results are again summarised in the table below.

Prerequisite	Ang Mo Kio	Bedok	Clementi	Tsuen Wan	Sha Tin	Tuen Mun
Walkable Streets	✗	✗	✗	✓	✓	✓
Compact Development	✓	✓	✓	✓	✓	✓
Connected Community	✗	✗	✗	✗	✗	✗

Table 4.2 Prerequisite scores for each new town (author's work)

Figure 4.4 Barrier at the end of the one-way street in front of 127 Ang Mo Kio Ave 3

NPD credits

NPD contains fifteen different credits divided into eleven sets. Once again, new towns within each city score similar amounts of points, while the variation between cities is more noticeable. Some SLL and NPD categories are connected and cover similar issues. Starting with Neighbourhood Connections, this credit again deals with intersection density, just like the SLL Location credit. This time, the conversion from square miles to square kilometres was done correctly in the LEED ND manual. However, this credit asks for a higher density than before. As none of the new towns were able to meet the previous minimum density of 200 intersections per square mile, they yet again do not score any points for this credit. This credit's intent is to promote multimodal transportation, as well as encouraging daily physical activity (i.e. walking and biking). Another category that promotes walking is Walkable streets.

Walkable Streets covers street design and shaded walkways. The data for this category was mostly obtained through Google Street View. Singaporean new towns have two types of streetscapes: the highly walkable town centres and the more car-friendly neighbourhoods. The town centres have shops on ground level with residences on top. These areas are characterised by pedestrian-only areas, frequent building entries and a comfortable building-height-to-street-width ratio of more than 1:3. There are no blank walls for more than 50 feet and shops have large windows. This benefits the walkability of the area. One point of improvement would be to keep windows unshuttered when shops are closed. Walkability in the neighbourhoods, on the other hand, is a more difficult story.

There are sidewalks along both sides of all streets and roads in the new towns. These are often shaded with trees or other structures. Especially paths that connect multiple apartment complexes to a bus stop are often shaded with an ornate structure. However, as explained before, most buildings face tertiary streets. This means that there is often a great distance between most buildings and the streets and roads. The building-height-to-street-width ratio is also difficult to establish, as there are many empty gaps between the buildings. Only the narrow sides of apartment complexes face the roads, as the complexes are built perpendicular to them. On the other hand, despite the roads and streets being fairly wide, buildings are also fairly tall, which results in a sufficient ratio. Nevertheless, it would be hard to describe these places as walkable since pedestrians are walking along six-lane roads. It feels to me as if apartment complexes make up islands of residential blocks, and to get to another island (e.g. for work or to shop) you must enter the circulation network of wide roads. These are places that feel like they were designed to move as much traffic as possible, not

necessarily for walkability. Due to this design, Singaporean new towns score about half of the points in category Walkable Streets.

Hong Kong is a different story. Streets are comparably narrow, and buildings are quite tall. Ratios are well above the LEED ND minimum of 1:3 and most buildings are directly up against the sidewalks. There are almost no trees to provide shade (see Figure 4.5). Also, while there are small shops with frequent building entries, there are large malls with few ones. Some areas feel rawer and have many shuttered windows and blank walls. While less noticeable in Singapore, Hong Kongese new towns seem to have large differences. From very polished areas with sleek and impressive buildings to some rougher parts with dark alleyways. The difference in performance between Singaporean and Hong Kongese new towns comes down to this: while it is true that Singaporean roads are less walkable than Hong Kongese streets, the Singaporean retail areas perform slightly better than the Hong Kongese ones. If you also consider the absence of trees in the Hong Kongese streetscape, this results in a two-point gap between the new towns in favour of Singapore.

Figure 4.5 Chung On street

Moving on to Compact Development, this category looks at the number of dwelling units per square kilometre. For both cities, there was no direct data available on the density of dwelling units per new town. For Singapore, the number of dwellings per “subzone” was available (Brinkhoff, n.d.). The subzones that together cover the original new towns were combined, and the density was derived from this. With a density of 83 to 94 dwellings per hectare, Singaporean new towns score four out of six points. For Hong Kong, the calculation had to account for the sparsely inhabited mountains. Each “subunit” used for the calculation was handpicked from the census. In practice, there is a large gap in density between fully urban and more rural subunits. By using data on the population size (Brinkhoff, n.d.) and average household sizes (Census and Statistics Department, 2021), the number of dwelling units could be estimated. Hong Kongese new towns have an incredible density of 158 to 217 dwelling units per hectare, more than double the density of Singapore. LEED ND rewards maximum points for any density above 156 dwellings per hectare. All three Hong Kongese new towns were therefore rewarded maximum points.

It should not come as a surprise that large and dense new towns score well on the number of amenities. For the category Mixed Uses, all new towns receive maximum points, except for Clementi, which is smaller in size than the others. Continuing with amenities, all new towns also score well on Parks and Recreation due to the abundance of outdoor spaces

and gyms, sports fields, and swimming pools etc. Similarly, schools are only a short distance away for almost all residents in both cities (see Figure 4.6). Parking and Transportation Demand concerns a set of three credits. Parking footprint is reduced in all new towns, scoring them one point. Transit facilities are done well in Singapore, providing adequate shelter. Hong Kongese bus stops leave something to desired, with the lack of enclosure and seating areas. Regarding transportation demand management, no information could be found on whether there were any stimuli from the government or developers to promote multimodal transportation under residents. As result, these none of the new towns score the two points allocated to this credit.

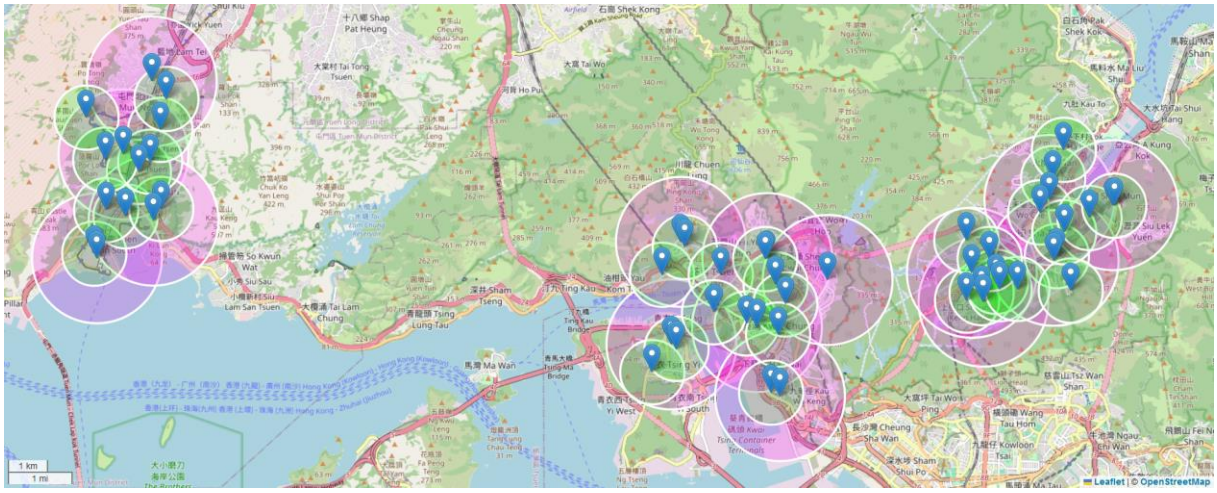

Figure 4.6 Full coverage of primary (green) and secondary (pink) schools in Hong Kongese new towns

Universal Design, Community Participation and Local Food were all absent in Hong Kong and Singapore at the time of construction. Community participation came up in later decades and has only recently moved towards practices that might satisfy the LEED ND requirements (Foroughi et al., 2023; Križnik et al., 2019). Similarly, Universal Design was later introduced, and existing buildings were improved (Architectural Services Department, 2004; Liu et al., 1983). In the case of Singapore, all new HDB buildings and dwellings must adhere to Universal Design standards (Ministry of National Development, 2023). Both cities are limited in their food production capabilities. Where there are some allotment gardens available, there are simply too few to satisfy the requirements (GardeningSG, 2024; Leisure and Cultural Services Department, 2014).

The final category is Affordable and Diverse Housing. Again, the analysis was limited by the availability of data, mostly because LEED ND uses categorisations that differ from the ones used by Singaporean and Hong Kongese statistical bureaus. Some choices regarding housing types had to be made and are further elaborated in the discussion. Affordable and Diverse Housing is made up of two parts: diversity and affordability. Diversity is calculated using the Simpson Diversity Index. Based on data from the Singapore Department of Statistics (2023), Singaporean new towns have an index score greater than 0.7, which indicates a high diversity. For Hong Kong, only some proxy data was available on housing sizes and ratios for the whole city (Housing Bureau, 2022). Different calculations yielded different estimates, ranging from 0.68 to 0.88. The most conservative estimate was selected, which indicates a medium diversity worth two points. To calculate the affordability, data by the Census and Statistics Department (2021) was used for Hong Kong. More than enough houses were priced up to 60% of the area median income. For Singapore, data by the HDB (2024) and Miao (2021) indicates the same. This means that both Hong Kong and Singapore score highly in affordability and diversity. However, note that housing diversity mostly reflects diversity in flat sizes, rather than housing types (condos versus freestanding houses etc.) (see Chapter 6). A summary of all SLL and NPD scores is provided in Figures 4.7 and 4.8 below.

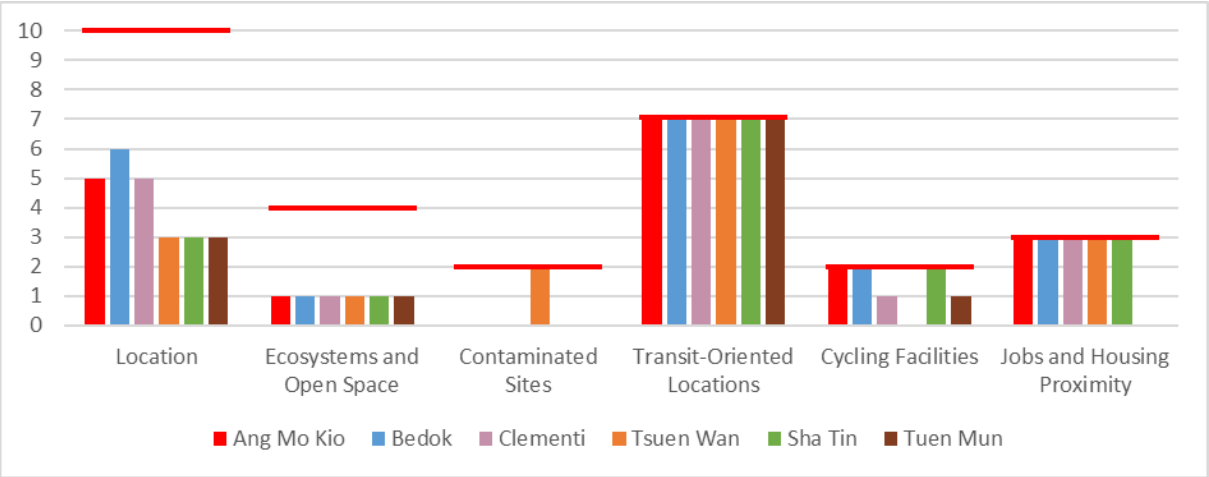

Figure 4.7 SLL scores per new town for each category, red line indicates maximum score for that category

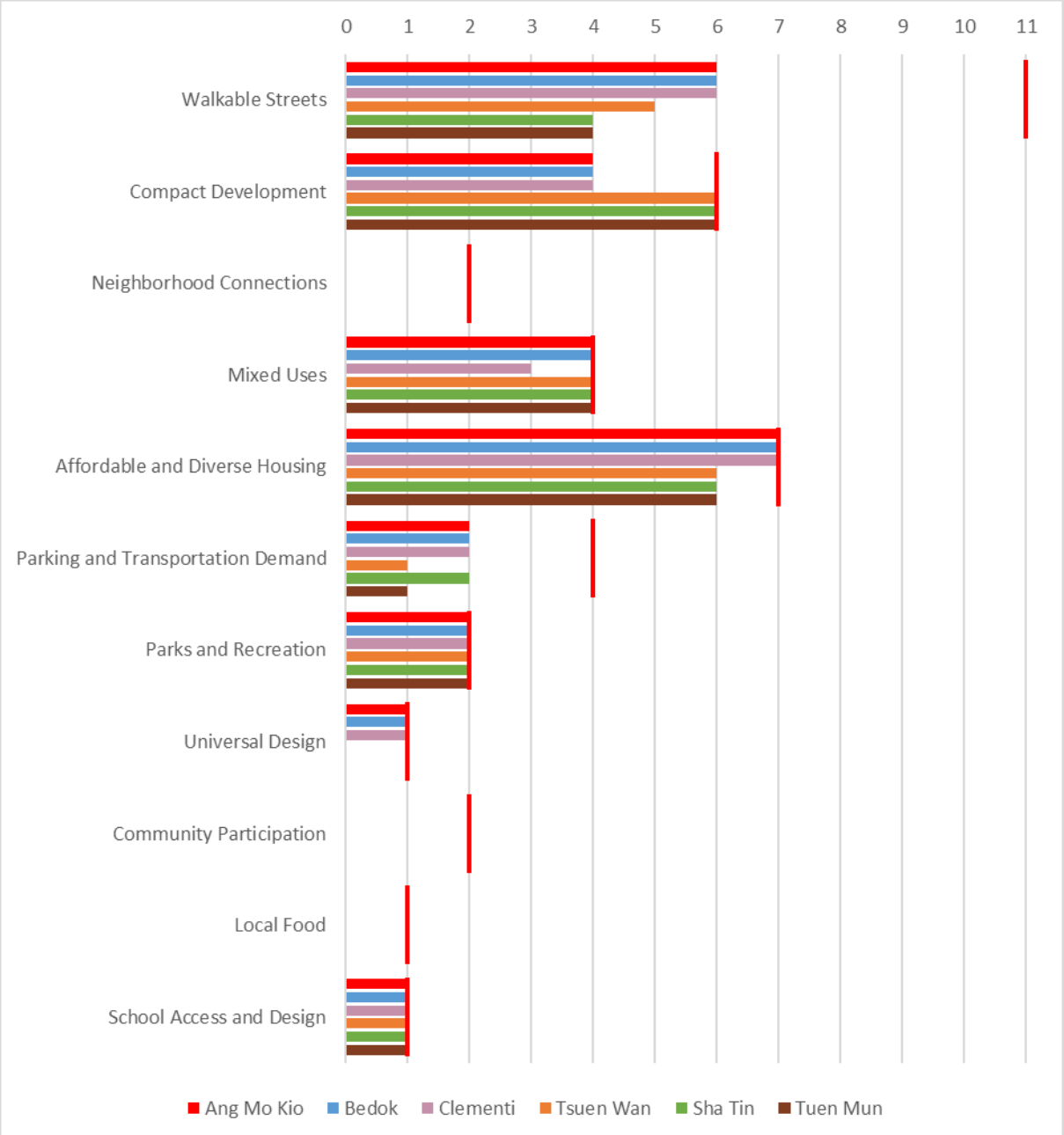

Figure 4.8 NPD scores per new town for each category, red line indicates maximum score for that category

5 Legislation, design, and finance

The findings of the LEED ND analysis were presented in the previous chapter. The sustainable performance of six new towns that were developed under the public leasehold system was assessed. In terms of the New Urban Agenda framework, the new towns are the local implementation of Singaporean and Hong Kongese urban policies. As discussed in Chapter 2, the quality of the local implementation is dependent on these urban policies. They must promote urban development that is effective, regardless of available capacity and resources. Additionally, they should promote a better layout, and inclusion and sustainable urban development over the long term. Urban policies are built on three foundations: legislation and regulations, urban design, and financial plans. This chapter delves into the foundations of the Singaporean and Hong Kongese urban policies in order to explain the observed performances of their new towns.

5.1 Legislation and regulations

According to the New Urban Agenda, good governance is essential for sustainable urban development, as it is a prerequisite for resilient services and for social, institutional, and economic activity in cities. Rules and regulations, and to the ability to enforce them, are thus needed to guarantee that planned urbanisation is carried out. Additionally, urban legislation and regulations enable inclusive governance, allowing the voices of marginalized citizens to be heard in decision-making (Clos, 2016). The following sections provide an overview of the tools that were used for land value capture. Additionally, it aims to illustrate the level of government involvement by drawing a picture of the type of governance that is characteristic for each city. Together, this should provide enough context to explain the performance of the new towns. The development of the construction industry is used as an example to demonstrate the level of government involvement in the cities. This example was picked as a well-functioning construction industry is a necessity for new town development. The overview starts with the history of land value capture in Singapore.

5.1.1 Land value capture in Singapore 1960-1990

Singapore is a small island city-state, which was founded as a British trading post in 1819. It remained a British colony until 1959 when it was granted full internal self-government. In the first elections, the People's Action Party (PAP) became the majority party under the leadership of Lee Kuan Yew. The PAP has remained in power ever since. In 1963, Singapore became part of the newly formed Federation of Malaysia, only to withdraw again in 1965 due to struggles within the federation. This is when Singapore officially became an independent sovereign country (Heo, 2014; Phang, 1996). When the city-state was granted self-government, it faced rapid population growth and a severe housing crisis. (Phang, 1996). Moreover, the survival of the city-state was uncertain. Political leaders would give speeches on the survival of the country every two weeks during the 60s and 70s (Editorial Team, 2017). It was during this time that the newly formed government sought ways to enhance its legitimacy and to develop the economy (Heo, 2014).

Singapore's history as a British colony meant that their property laws and planning practices have been largely adopted from Britain's (Hui et al., 2004). Under the Federation of Malaysia, the constitution prevented that any person could be deprived of property, except as specified by law. Compulsory acquisition would only be allowed if the property-owner was adequately compensated (Phang, 1996). However, Phang describes that the government of Singapore was committed to the idea that urban land should be owned by the state. This was in part due to the land scarcity of island city-state (Hui et al., 2004; Phang, 1996). After gaining independence, Singapore adopted the Land Acquisition Act in 1966. This act was meant to prevent landowners from making "unreasonable profits" out of land to be acquired for public development (National Library Board, 2023). Land prices for acquired land were greatly suppressed and unrelated to market prices or the landowner's purchasing price (Phang, 1996). Wang and Yeh (1987) describe this method for acquiring land as "effective

and efficient". Fainstein (2012), on the other hand, calls this approach authoritarian and questions whether it is just. Of course, both statements can be true at the same time. Nonetheless, under the Land Acquisition Act, the state managed to become the biggest landowner, having acquired 76.2 percent of all land in Singapore by 1985. This is more than double the 31 percent that the government owned in 1949 (National Library Board, 2023).

A key player in land acquisition and public development is the Housing & Development Board. The Singaporean government established the HDB in 1960. It is solely responsible for the planning and physical construction of public housing estates, new towns and related infrastructure on state-owned land. Furthermore, the HDB is responsible for land acquisition and is supported in this by the powerful Land Acquisition Act. Land acquisition has allowed the HDB to build over half a million public housing units in roughly twenty years. Being an statuary board, the HDB enjoys great autonomy in land acquisition, town planning, building design and material usage (Heo, 2014; Wang & Yeh, 1987). Once land is acquired and new towns are completed, the HDB hands the public infrastructure (e.g. roads and schools) over to their respective government agencies. The public housing units remain in control of the HDB. Almost all buildings in the new towns are constructed by public agencies; there is only little room for private participation. This strict control of the HDB ensures that essential facilities are available to the first residents that move into the new towns (Wang & Yeh, 1987). Moreover, market failure is avoided and the capture of development gains for the public is guaranteed. The Land Acquisition Act makes this system possible as it prevents private land speculation (Fainstein, 2012).

Aside from public housing construction, the Land Acquisition Act also allows for urban renewal and the expansion of the central business district. Ho (2014), Chairman of the Singapore's Urban Redevelopment Authority, describes that three quarters of the population was crammed into the city centre in 1965. Many families lived in crowded and unhygienic conditions. The houses that were mostly built in the nineteenth century did not have a proper sewage system and diseases like tuberculosis spread easily. Outside the city, people lived in squatters' colonies with similarly bad hygiene. The government did not simply evict the people who were originally living in these places. A resettlement programme was established as part of the urban renewal process. The HDB was responsible to accommodate the residents in new towns. Public housing provided more hygienic and spacious living conditions (Ho, 2014; Wang Yeh, 1987). Due to the resettlement programme, land in the city could be acquired for redevelopment and residents could be relocated. Then, the acquired lots are amalgamated and levelled. Lastly, the new lots are auctioned off to private developers. The CDB was expanded through this process (Wang & Yeh, 1987). As explained before, the landowners were compensated at rates below the market price (Phang, 1996).

Over the years, the HDB housed more and more people. By 2009, 82 percent of households lived in public housing and 95 percent of occupants owned their flats. It is customary in Singapore to own your public housing flat instead of renting it. However, the HDB remains in control of the apartment buildings and the land under them. This is due to the public leasehold system. Ever since 1967, apartments are sold on leases of not more than 99 years (Fainstein, 2012; Hui et al., 2004; Government of Singapore, 2024). The HDB reinvests the proceeds from the property leases in the improvement and expansion of the housing stock (Fainstein, 2012). Note that 99-year leases do not realise any short- and medium-term gains for the public from land value increments (Fainstein, 2012). Short- and medium-term gains are realised through other value capture tools (OECD & Lincoln Institute of Land Policy, 2022). There are three: charges for development rights, infrastructure levies, and land readjustment (see Figure 5.1). The last two instruments were only introduced in the 1990s. These instruments are used to keep the HDB housing stock up to date. However, they did not contribute to tackling the housing crisis during the period of rapid urbanisation. Therefore, these will not be further discussed. The first one, charges for development rights, did exist during this period. These charges come in two types: the Development Charge (DC), and the Differential Premium (DP).

Most land in Singapore is owned by the state and sold under leasehold. The remaining land is freehold land. The DC relates to freehold land and the DP to leasehold

land. The DC is applied when a development receives planning permission to go beyond the Master Plan, or zoning plan. For example, if the landowner is allowed to build more on his plot, or if the land-use is changed into a higher-value use. This allows the government to recover part of the windfall that the landowner experiences from the planning permission. The DP is applied when lessees of state land wish to alter the lease, for example, by removing restrictive covenants, or to increase the term of the lease. Again, this allows the government to recover part of the property value increase that the owner experiences from the permission (Hui et al., 2004; OECD & Lincoln Institute of Land Policy, 2022).

Instrument (OECD-Lincoln taxonomy)	Local name	National legal provision	Implementation	Use
Charges for development rights	Development Charge or Differential Premium	Section 40 of the Planning Act (1998)	National government	Always
Infrastructure levy	HDB upgrading programs	Part IVA of the Housing Development Act (1992)	National government	Always
Land readjustment	HDB Selective En bloc Redevelopment Scheme, En bloc collective sale	Land Acquisition Act (1966), State Lands Act (1996), Part VA of the Land Titles (Strata) Act (2009)	National government, special purpose bodies, land developers and private property owners	Frequent
Strategic land management	Government land acquisition, Government Land Sales Program	Land Acquisition Act (1966), Urban Redevelopment Authority Act (1990), Planning Act (1998), Singapore Land Authority Act (2002)	National government	Frequent

Figure 5.1 Main land value capture instruments in Singapore (OECD & Lincoln Institute of Land Policy, 2022)

Hui et al. (2004) identified another land tax instrument under their definition of value capture, namely the annual tax on real property. This property tax is levied on all immovable properties in Singapore, including HDB flats. The owner of the property pays a certain percentage of tax on the annual value of their property. The annual value is the estimated annual rent that a property could earn if it were to be rented out, excluding maintenance fees and insurance. So, as if the landlord bears the expenses of repair etc. The annual value is estimated based on market rentals of similar properties, regardless of whether the property is owner-occupied, rented out, or vacant. Additionally, the annual rental income that an owner actually receives might also differ from the estimated annual value (IRA, 2024). The definition of annual rental value has stayed the same since the Property Tax Ordinance of 1960 (Lee, 1975). Therefore, I assume that a tax worked similarly during the period of rapid urbanisation. However, it should be noted that the tax system was modernised in the 1990s (Asher & Nancy, 2003). In summary, Singapore uses the powerful Land Acquisition Act to acquire land and prevent speculation. Public housing is built on state-owned land and sold under (public) leasehold. Thirdly, the government charges for development rights for both freehold and leasehold land. Lastly, owners must pay an annual property tax.

Authoritative Singapore

After it was granted full internal self-governance in 1959, the Singaporean government published its first official plan for economic development in 1961. It was called the State Development Plan, which was also referred to as the First Development Plan, or simply the Plan. It was produced by the Ministry of Finance and the Plan aimed to solve some pressing issues, such as high unemployment and economic stagnation, through the expansion of industry (Puay Ling, 2017). The Plan sought to do so by creating favourable opportunities for investment in the private sector, and thereby to attract foreign direct investment (Schenk, 2004). The government would develop the necessary infrastructure to support industrialisation and construction was to play a major part in it: developing roads, expanding power and water supplies, realising ports, among other infrastructure. Also, housing was deemed a priority in the Plan. The then newly formed HDB was investigating the possibilities of using new construction methods, such as prefabrication (Ofori, 1988). However, prefabrication technology was only adopted for the construction of flats in the 1980s (HDB, 2024).

The development of the construction industry was as such essential to the Plan. Ofori (1988) describes how the public sector in Singapore managed the development of this industry through investments and regulations. A Commission of Inquiry was created in 1960 to assess the capacity of the local construction industry. It was also to recommend ways and means of continuously monitoring and keeping the balance between capacity and volume of construction activity. The Singaporean government was very interested in the well-being of the local construction industry. Housing, roads, bridges, and other infrastructure are all realised by this industry. Ofori (1988) suggests that the government believed at the time that economic growth is partially dependent on how rapidly the construction industry expands.

A review of the implementation of the Plan showed that local construction was indeed unable to keep pace with the investments. Of all the money that the government had budgeted for the development of the country's infrastructure and housing, only 74% was used. This illustrates the construction industry's lacking capacity during the first years of Singaporean independence. A bottleneck for the government's plans was the lack of trained technical personnel and administrative inexperience. Only the HDB managed to reach its targets and even went beyond them, realising 53 thousand dwelling units instead of the 51 pursued in the Plan (Ofori, 1988).

Over the years, the government has used its influence to support the construction industry in several ways. It made sure that enough building materials were available. It removed price controls and import restrictions when it saw the need. It also addressed the worker shortage by training more local personnel, while simultaneously making it easier for contractors to recruit foreign workers. The government also used its public projects to introduce new technique into the local industry, such as the use of industrialised building methods and the use of metal scaffolding (Ofori, 1988). However, this extensive government interference also has the downside of making local contractors dependent on them. By 1985, the industry had become increasingly reliant on the HDB for the management of the projects. Nevertheless, due to the direct assistance from the government, several Singaporean construction companies have developed from small family-owned businesses to modern companies that are listed on the Singaporean stock exchange (Ofori, 1988). It is safe to assume that without the rapid expansion of the construction industry, the development of the massive new towns of Ang Mo Kio, Bedok and Clementi would not have been feasible.

The state and development of the construction industry is perhaps best reflected in the Slab blocks. This type of housing was characteristic for the 1960s and 70s. It is a long block comprised of basic, small flats lined along a common outside corridor. Slab blocks were easy and quick to construct, and their simple design kept costs low. The only drawback is that they could not be built too high, usually ranging from ten to sixteen storeys (Tan et al., 2024). Twelve storey Slab blocks are among the most common housing types observed in Ang Mo Kio, Bedok, and Clementi. Their prevalence makes for a monotonous image. Tan et al. (2024) further describe that the Slab block is ideal for Singapore's tropical climate. Each unit has access to the outside from two sides. This allows the wind to flow through each unit and cool it. As construction technology improved, Slab blocks got taller. The common corridors were widened to provide residents with a space to meet their neighbours. In 2001, the HDB started the Lift Upgrading Programme to add new lifts to older apartment blocks. Due to the high cost of elevator technology in the 1960s, elevators were more sparingly used. Since then, more than five thousand HDB blocks have received full direct elevator access. In the 1980s, as Singaporeans grew more affluent and construction technologies improved, point blocks became popular. These buildings provide more privacy for residents and have windows on three sides of the apartments for better lighting (Tan et al., 2024).

The improvement of elevators is another example of government-driven technological innovation. Once the HDB had committed to the high-rise typology, lifts became an essential part of its public housing programme. In order to provide adequate service to the tenants of the ten-plus storey buildings, elevators had to be safe, reliable and efficient. Jacobs and Yuen (2018) explain how the HDB brought together the building layout, regulatory authorities, residents and other users, department such as the Public Utilities Board (responsible for the supply of power), as well as manufacturers and suppliers of elevators

and their components. Original HDB elevators were rather basic and their performance poor. As such, it was one of the main, if not the single biggest, grievances of tenants. The HDB's solution to this problem went in two key directions. Firstly, it changed the policy for the number of elevators in apartment complexes in future designs. If one of the elevators was to fall out, residents could use the other one. This helped minimising the inconveniences. Secondly, HDB started with in-house research and development. It increasingly set technical specification that suppliers were required to adjust their products to. Many manufacturers were willing to do so due to the size and length of the contracts that the HDB offered (Jacobs & Yuen, 2018). Through these regulations, the high rises that are so characteristic for the Singaporean cityscape were made possible. Also, the development of construction in Singapore goes to show the states preference for direct government participation and control. The far-reaching government control is prevalent in many areas, including in urban design. More on that in paragraph 5.2.

5.1.2 Land value capture in Hong Kong 1960-1997

Like Singapore, Hong Kong used to be a British Crown colony. After the UK won the Opium War in 1842, China ceded Hong Kong and the colony was founded. However, Hong Kong never gained independence and was returned to China in 1997 (Tsang, 2003). Again, like Singapore, Hong Kongese property laws and planning practices have been largely adopted from those in Britain (Hui et al., 2004). Although both Singapore and Hong Kong have adopted a public leasehold system, there are some differences.

Ever since 1843, virtually all land in Hong Kong is the property of the state and sold under a public leasehold system. Before 1997, leases were mostly granted in 75- or 99-year terms, with a few exceptions having been granted 999-year leases. After the reunification with China, new leases usually last 50 years. Leases granted under British administration are known as Crown leases, whereas leases after reunification are known as Government Leases (OECD & Lincoln Institute of Land Policy, 2022). The only site in Hong Kong that enjoys freehold rights is the St John's Cathedral (Caudevilla, 2016). Hong Kong's Lands Department is responsible for the grant and enforcement of leases. Leases are most often granted through public actions, where the lessee pays a premium to the government for the grant. The land is subject to pre-publicised conditions. Upon purchase, these Conditions of Grant become binding (Caudevilla, 2016). Premiums make up a large part of the government's revenue. From 1975 to 1984, premiums brought in 15% of total government revenues on average (Wong et al., 1999).

The following instruments are used to capture short- and medium-term land value increases (see Figure 5.2). Unlike Singapore, Hong Kong did not use annual rent for land value capture. Hong Kong has only been charging annual rent based annual market rental value of property since the 1997 (Caudevilla, 2016; Hui et al., 2004). Before, Crown leases were only charged a nominal rent, which is negligible in size (Lands Department, 2017). However, Hong Kong does charge a premium for lease modifications similar to Singapore's Differential Premium. The main difference is that Hong Kong charges the full market value of the lease modification, whereas Singapore's development premium is about 50 percent of the market value (Hui et al., 2004).

Instrument (OECD-Lincoln taxonomy)	Local name	Legal provision	Implementation	Use
Strategic land management		Chapter 131 of Town Planning Ordinance (1939) and Chapter 28 of Land (Miscellaneous Provisions) Ordinance (1972)	Local government	Frequent
Charges for development rights		Article 7 of the Basic Law	Local government	Always
Infrastructure levy	*Recurrent infrastructure levy*	Government Rent Ordinance (Chapter 515) and Rating Ordinance (Chapter 116)	Local government	Always
Land readjustment		None	Local government	Rare

Figure 5.2 Main land value capture instruments in Hong Kong (OECD & Lincoln Institute of Land Policy, 2022)

New town development is less centralised in Hong Kong than in Singapore (Wang & Yeh, 1987). The Hong Kongese counterpart of the HDB was the New Territories Development Department (NTDD). The NTDD was responsible for the coordination of the planning and land reclamation for Tsuen Wan, Sha Tin and Tuen Mun. The NTDD was also responsible for the development of facilities and infrastructure in the new towns. Later, the NTDD was reorganised and amalgamated with other departments to form the Civil Engineering and Development Department (CEDD). Note that Hong Kong did not work with a Land Acquisition Act like Singapore's. It did not need to since it already owned all land within its boarder. Nonetheless, due to the mountainous terrain, building new towns in-land was not feasible. Therefore, the Hong Kongese strategy was to reclaim land from shallow bays. This is also done in other parts of the city to create space for expansion. For example, the enlargement of the central business district is made possible through land reclamation. Redevelopment of the existing CBD is left entirely to the private sector (Wang & Yeh, 1987).

The reliance on the private sector is perhaps partially due to the *laissez-faire* policy of the Hong Kongese government. Extensive government intervention was the norm for the development of the other Asian Tiger economies. Take the example of industrialisation. As we saw above, Ofori (1988) and Jacobs and Yuen (2018) described in detail how far the Singaporean government went to support the development of their local construction firms. In the case of Taiwan and South Korea, Kresse and Van der Krabben (2021) have also discussed how the governments of countries South Korea aided the development of their local industries. Schenk (2004), however, clearly positions Hong Kong against the other three Asian Tigers and even Japan. She explains that Hong Kong can traditionally be characterised by its positive non-interventionism.

Hong Kong also had a more liberal attitude towards the development of new towns as compared to Singapore. Wang and Yeh (1987) explain that the development strategy of new towns in Hong Kong was rather similar to Singapore's. However, in Hong Kong, private investment played a much larger role, and the resettlement of residents to new towns was done more voluntarily. One-third to one-half of the development was expected to come from the private sector. The development of private housing and commercial and industrial buildings was to be mainly in response to market demand. Still, new town construction was mostly led by public housing construction.

The NTDD had less control over new town development than its Singaporean counterpart. Unlike the HDB, the NTDD had to work together with other government agencies. After the land was reclaimed, it was handed over to the respective departments for infrastructure and housing development, or it was auctioned off to private investors. The involvement of different departments meant that the development of the new towns went less smoothly. The construction of public housing had a high priority and was done by the Housing Authority. Other departments built the supporting infrastructure, though they had more responsibilities and priorities than the development of new towns. Consequently, the

provision of infrastructure, public facilities, and utilities often lagged behind the rapid growth of the public housing population. Wang and Yeh (1987) describe, for example, that there were inadequate places in primary schools in Tuen Mun when residents first moved there. Also, the highway that links Tuen Mun to the other urban centres was only partially completed when already a substantial number of families had moved in.

This lack of efficient coordination in the development of infrastructure and transportation facilities has affected the ability of new towns to attract private investment in housing and industry. These investments are crucial for the creation of jobs and the construction of private housing. The inadequate transportation system discourages factories to move further away from Hong Kong Island and Kowloon. Moreover, the many small businesses had strong ties within the city centre which prevented them from moving to the new towns. Tuen Mun has been affected worst by this. Sha Tin was better at attracting investment and middle-income residents since it was located on a major transportation link, but still did so slower than expected. Only Tsuen Wan was truly successful at attracting industrial investment. Tsuen Wan had traditionally already been an industrial satellite city before it was further developed into a new town (Wang & Yeh, 1987). This is also reflected in the LEED ND credit for Jobs and Proximity. Tsuen Wan and Sha Tin did manage to attract enough jobs to satisfy the requirements, but Tuen Mun did not (He et al., 2020).

The demand for private housing in new towns stayed relatively low due to low-income image of new towns. Unlike in Singapore, public housing development only provides dwellings for low-income families. As mentioned before, about fifty to seventy percent of housing in new towns was designated for public housing. This created the image that new towns were only for low-income communities, which deterred middle-income families from moving there. Additionally, the lack of white-collar jobs in new towns and the inadequate transportation to the main areas where there are such jobs also put off middle-income families (Wang & Yeh, 1987). In summary, the Hong Kongese approach might be lauded for being more liberal than Singapore's, the government's inadequate provision of necessary infrastructure and facilities discouraged vital private investments in industry and housing.

During the planning and construction of Tsuen Wan, Sha Tin and Tuen mun, legislation for environmental impact assessments did not exist (Hills, 1987). Such legislation would only be considered since the late 1970s. Hong Kong's seventh new town, Junk Bay, was the first for which any detailed environmental assessment was undertaken. Hills (1987), explains that the assessment was more so an afterthought, aimed to reduce the potential impacts on the immediate surroundings. Rather than identifying optimal new town locations based on environmental criteria, new town development appears to have been mostly based on engineering and financial considerations. The main priority in the selection of a location for new town development has been to minimise development costs. The Hong Kongese government seems to have been preoccupied with creating economically self-contained and socially balanced new towns (Hills, 1987). The planning and development of Tsuen Wan, Sha Tin, and Tuen Mun seem also to have focused mainly on these considerations (Wang & Yeh, 1987). As a result, the impact on the environment has been considerate. For example, adequate sewage treatment facilities were only constructed in the 2000s (Morton, 2009), and pollution and land reclamation resulted in the decline of otter populations (Hui & Chan, 2024).

Construction industry development

When it comes to the development of the construction industry, Hong Kong had quite a different approach than Singapore. Or any of the other Asian Tigers and Japan for that matter (Schenk, 2004). In Japan, South Korea and Taiwan, the government channelled the finance for industrialisation through the banking system. Singapore's industrialisation relied heavily on foreign direct investment. Contrastingly, Hong Kong's approach is characterized by a laissez-faire attitude. Construction firms were largely dependent on private bank loans. This is not due to a lack of industrialisation policy, but rather a deliberate policy choice by the liberal government.

It is often argued that the lack of government intervention has restricted the development of the construction industry, both during the rapid development of Hong Kong

(Schenk, 2004) and in subsequent decades (Chiang & Cheng, 2010). This is due to the structure of the Hong Kongese economy. Small and medium-sized businesses make up a significant portion of Hong Kongese enterprises, both in construction and in other industries (Chiang & Cheng, 2010; Schenk, 2004). It is thought that this limitation is due to the lack of bank loans for these businesses. However, Schenk (2004) explored two potential causes for this between 1950 and 1970 and found that there was a lack of proof for this claim. She explored the potential influence of cultural obstacles and of information asymmetries on the restriction of loans, both in relation to small firms. Schenk found that banks were in reality eager to overcome information asymmetries and to engage in industrial lending. They established dedicated departments, hired specialised personnel, and provided special products targeted to these firms. When it comes to cultural obstacles, both foreign and Hong Kongese banks were reluctant to engage with small businesses, which refutes cultural causes. In addition, there was no systematic discrimination against Chinese borrowers by Western banks. It seems like most small firms simply did not approach banks for loans. Initial finance for these firms came often from personal savings. Then, once the businesses were under way, hire purchase, or paying for equipment in instalments, seems to have been important.

Chiang and Cheng (2010) found that small contractors refrain from borrowing because they considered interest payments to be too high. They also found it too risky to take on multiple projects at once. However, the limited access to finance for small contractors inhibits innovation, haltering the development of the construction industry as a whole. Since building technology remains traditional, larger contractors can subcontract most of the work to smaller firms. As these firms often work on labour-only basis in a highly competitive market, keeping wages are kept low. This creates a vicious cycle that further inhibits innovation (Chiang & Cheng, 2010). However, this is mostly the case for private housing projects (Tam et al., 2007). Traditional building technologies include *in situ* concrete casting, bamboo scaffolding, timber formwork, painting, and plastering. This makes construction inefficient and labour intensive, and results in excessive construction waste. Public housing projects, on the other hand, have adopted prefabrication in the 1980s. This is because the Housing Authority sought a way to maintain a production of over 50,000 flats per year. In order to achieve this target, prefabrication and modularisation were fully adopted. This allowed for un-interrupted production and low maintenance (Law, 1998), and minimised construction waste (Tam et al., 2007).

So how did all of this affect the urban from? Various public housing typologies can be found in new towns. Their designs are mostly governed by economic efficiency and the standardisation of production. The housing was built as high-density concrete towers, ranging from 28 to 38 storeys high, with 18 to 28 units per floor. The designs served to maximise the land and construction cost efficiencies. During the 1970s and 1980s, public housing came mainly in the form of H Point blocks and Trident blocks. The names refer to the H- and Y-shapes of the towers. During this time, little thought was given to cultural values or behavioural patterns of the residents (Law, 1998). In the 1980s, Harmony blocks were introduced. Despite their later introduction, Harmony blocks are also prevalent in Tsuen Wan, Sha Tin, and Tuen Mun. Like the Singaporean Slab blocks, H Point blocks have open central corridors that provide light and cross-ventilation to each flat. Typical flat sizes were quite small, with $35m^2$ being the norm for a family of four. Trident blocks started using prefabricated building parts. The shape maximised views and improved privacy. Moreover, the quality of facilities was improved to be comparable to facilities in private housing. As living standards further improved, residents demanded more privacy and more personal space. To keep up with the production target of 50,000 flats per year, Harmony blocks fully embraced modularisation and prefabrication. The modular and flexible design meant that Harmony blocks could be constructed on more sites (Law, 1998). The following paragraph delves deeper into the overall design of the new towns.

5.2 Urban design

The New Urban Agenda defines urban design as the second foundation of urban policies. High quality urban planning and design results in compact, efficient, and people-oriented cities. They are well-connected, integrated, and equitable. Good urban design is a prerequisite for urban resilience. It promotes environmental sustainability, access to essential services and jobs, and the availability of public space. Urban plans require governments to be pro-active and plan well-connected networks of streets, public spaces and infrastructure. At the same time, construction in vulnerable areas should be avoided (Clos, 2016). The LEED ND analysis found that Singaporean and Hong Kongese new towns are well-designed in some regards but leave something to be desired in others. This paragraph will explore the design philosophy of these cities.

5.2.1 Singaporean modernism

The LEED ND results indicate that Singaporean new towns score well on compact development, and the availability of jobs and amenities such as parks, schools, and shops. This is because the new towns were designed to be self-contained. The concepts of 'self-containment' and 'balanced development' in new town design came from the British planning tradition (Wang & Yeh, 1987). As some of the first-generation politicians were civil servant in the British colonial government, they had adopted some aspects of the British planning culture. The British understanding of what makes a good city formed the foundation for Singaporean urban planning (Editorial Team, 2017). Especially the new towns built since the early 70s are meant to be self-contained. These are the new towns built during and after the “third stage” of new town development as defined by Hee and Ooi (2003), and include Ang Mo Kio, Bedok, and Clementi. The first satellite town in Singapore, Queenstown, was developed on the edge of the existing urban centre. This served the purpose of both reducing the cost of the provision of utilities, as well as improving the image of the new town-concept. However, Queenstown also relied heavily on the city centre’s facilities. In the late 60s, Toa Payoh was the first new town where the concept of neighbourhood planning was introduced to create a self-contained city centre in terms of shopping and social activities (Wang & Yeh, 1987). However, since the 1970s, new towns are meant to be truly self-contained. Liu et al (1983) explain that, in theory, daily life should be able to take place all within the boundaries of the new town. The household head can work, the housewife can shop, and the children can go to school. Moreover, there are facilities for entertainment, sports, and other forms of recreation. Only facilities that require a larger population, such as stadiums, are located further away.

However, Singapore did deviate from the British or even Western planning practices in one crucial aspect: density. The first cabinet decided that high-rises were the only way to achieve homeownership for all, due to the limited availability of land. Former Singapore Master Planner Dr. Liu Thai Ker explains that this was during a period when western experts condemned high-rises due to their poor experiences with them (Editorial Team, 2017). Singapore took up this challenge and came up with a solution: social engineering. The HDB found that the West treated public housing as a place for the lowest of incomes. Their solution was to mix different populations in specific ratios to prevent the creation of ghettos and to promote the integration of different social groups. For example, Dr. Liu describes that Singapore had a large squatter population and how resettlement mixed 1/3 former squatters with 2/3 urban folk. Wang and Yeh (1987) argue that resettlement also served the purpose of transforming squatters into a disciplined labour force. Moreover, the HDB maintains an ethnic balance in proportion to the ethnic distribution of the Singaporean population ever since 1989 (Fainstein, 2012; Phang & Helble, 2016). Lastly, the HDB carefully mixes different apartment sizes to induce social cohesion (Editorial Team, 2017). The HDB builds five different flat sizes, namely the one-, two-, three-, four-, and five-room flats, with sizes ranging from 33 to 135m2 (Liu et al., 1983). Nowadays, the HDB also builds larger executive condominiums which are sold on the open market (HDB, 2024). By mixing these apartments, different populations with different incomes and in different stages of their lives are also mixed.

Earlier it was already explained how Singapore is characterised by far-reaching government control. Social engineering is just another example of this. It is unsurprising that Singapore is often described as being authoritarian (Jacobs & Cairns, 2008). However, Jacobs and Cairns argue that the government's heavy involvement was due to their desire to improve the city-state's chance at survival. Early politicians decided that the newly independent country had to modernise politically, culturally, and economically. As such, Jacobs and Cairns describe the style of governance more positively as "disciplinary modernisation". Still, it is evident that personal freedom was limited in certain cases. The desire for modernity also greatly influenced urban design. Though, peculiarly enough, Singapore's urban development is rarely connected to the modernist ideology. This is because the city-state's modernist urban design is promoted under the guise of the garden city concept (Johnson, 2008). Singapore's first Prime Minister Lee Kuan Yew introduced the garden city concept to transform Singapore into a city with abundant greenery and an environment clean of litter. Not only would this make life more pleasant for residents, but he also hoped it would attract tourists and foreign investment (National Library Board, 2015). However, Johnson (2008) argues that the transformation and modernisation of Singapore represents to a great degree the modernist ideals outlined by Le Corbusier. In his view, Singapore has little in common with the "garden city" concept that Howard had envisioned. Jacobs and Cairns (2008) and Johnson (2008) both sketch the image that Lee Kuan Yew's goal for a clean and green city was not so much about planting trees. Rather, it was about the complete transformation of a country and its citizen's unrefined behaviour into a FDI-attracting paradise. Combining concepts from modernism and garden cities results in a physical structure known as "towers in the park", where high-rises are dotted around in greenery and connect via broad roads and streets.

On the other hand, urban design was often very pragmatic rather than ideological. Liu et al. (1983) explain that building orientation in the 60s and 70s was done mainly in relation to sun and wind. This resulted in most buildings being built in an east-west direction. The HDB acknowledged that this created a poor sense of enclosure and the loss of relation to the human scale. This is perhaps best reflected in LEED ND by the difficulty I experienced in determining the building-height-to-street-width ratio. Due to the east-west orientation, many apartment complexes are oriented perpendicular to the north-south going roads in Ang Mo Kio, Bedok, and Clementi. This left gaps between the buildings with too low ratios. However, only 15% of the street needs to meet the ratio requirement, which Singaporean new town design did manage to do.

Another big influence on the urban design is the 1971 Concept Plan. This plan closely integrated land use and transportation (Jung, 2024). The location of other infrastructure, such as drainage and power plants, was also carefully considered. Dr. Liu explains that long term city-wide planning proved essential in ensuring that infrastructure was developed in the proper locations. While Singapore was still poor, it had already planned Mass Rapid Transit (MRT) lines on paper. When money became available in 1982, land had already been acquired and the space had been reserved for the lines. This guaranteed the success of the MRT project (Editorial Team, 2017). MRT formed the basic spines for transport across the island, with new towns being located around MRT station. As such, Singaporean urban design has characteristics of transit-oriented development, where compact mixed-use neighbourhoods are arranged around a transit station (Jung, 2024). However, this type of dense development also resulted in urban heat islands (UHI). Goh and Chang (1999) found that the high-rise residential buildings intensify the UHI effect. Fortunately, the Singaporean government today considers a more climate-sensitive planning approach at local scales (Jung, 2024). The HDB has already been experimenting with high-density waterfront housing, common green areas, and the use of energy-efficient technologies to cool down new neighbourhoods since 1996 (Ming et al., 2010).

5.2.2 Hong Kongese self-containment and balance

Being a former British colony, Hong Kong not only adopted British rules and legislation, but also new town planning concepts (Hills, 1987; Jung, 2024; Law, 1998; Wang & Yeh, 1987).

In theory, all new towns were designed to be self-contained in order to reduce the dependency on the main urban areas for work and facilities. They were expected to provide adequate job opportunities, and shopping, recreation and community facilities for the residents. The aim was also to create socially balanced neighbourhoods by mixing public and private housing, and by mixing homeowners and renters (Wang & Yeh, 1987). Of course, these two goals were not achieved due to an uncoordinated development, a lack of private investment, and the perception that new towns were for low-income families. Nevertheless, the following section will explore how “self-containment” and “balance” influenced the urban design.

Based on British new town planning principles, Hong Kongese new towns were divided into three zones: the town centre, the residential areas, and the industrial areas. The town centre is the heart of each new town. It consists of four components: a civic centre, a cultural centre, a shopping mall, and a transportation depot (Law, 1998). The transportation depots provide regional transportation through the Mass Transit Railway (MTR). In the case of Sha Tin and Tsuen Wan, local transportation is provided as buses, while Tuen Mun enjoys the extensive Light Rail Transit (LTR) (Planning Department, 2022). An extensive network of pedestrian bridges at the upper floor levels connects the town centres. The bridges extend to the residential areas where car traffic is mostly restricted within the borders of housing estates (Law, 1998). These aspects are reflected in LEED ND by the by the maximum scores for amenities, as well as the maximum score for public transport connections. The elevated pedestrian pathways were not included in the assessment, as it was unclear whether these counted towards the intersection density. On the other hand, intersection density was so low, including the pedestrian bridges would presumably not have made a difference in the score.

Radiating from the town centre, high density public and private housing can be found. Only a small portion of private homes is located in villages. Facilities such as hospitals and public spaces are also located in the residential zones. The extremely high population densities observed in LEED ND correspond to the design plan of the new towns. The Development Department aimed at a population density of about 1,800 persons per hectare. Each housing estate was planned as a neighbourhood and had room voor 30,000 residents spread over ten residential towers. They provided a variety of amenities in the central part of the neighbourhood, such as a commercial complex and a bus station. In addition to these facilities, there was a requirement for 10 hectares of open space per 100,000 persons. This includes gardens, playgrounds, and sports fields, all located in and around the housing estates. An additional 10 hectares per 100,000 persons was designated for hiking, picnicking and Taichi in the green belt zone around the new towns (Law, 1998). Hong Kongese green belts serve to preserve green space on the periphery of new towns, which further exaggerates the extreme densities in the urban centres. Singapore, on the other hand, does not have green belts, resulting in a relatively spread-out urbanisation (Jung, 2024).

Law (1998) also hints at some level of social engineering occurring in Hong Kongese public housing estates. Social diversity would be achieved by mixing residents with different social backgrounds. This was done by mixing public housing renters to public housing homeowners in a ratio of approximately 3:1. However, further investigation does not yield any results. The original source for this statement could not be found, and no other study seems to suggest that social engineering occurred. However, it is unclear whether the new towns are segregated. As explained earlier, Wang and Yeh (1987) state that the first-generation new towns were unsuccessful at attracting private homeowners due to their low-income image. Moreover, research by Wang and Li (2016) found that public housing residents do not mix with private ones. While both groups are not necessarily geographically constrained, the public spaces they go to attract different socio-economic groups. A study by Xian et al. (2022) seems to indicate something similar. Their data suggests a case of residential segregation, meaning that socio-economic groups life separated from each other. Just like Wang and Li (2016), they found that people were constrained in their exposure to other socio-economic groups. However, they also found that segregation decreases during the day as compared to during the night, suggestion some mixing occurs. Nevertheless, Monkkonen and Zhang (2017) argue that Hong Kongese public housing reduces spatial

segregation. They found that the spatial distance between low-income and middle-income households is reduced by public housing, creating mixed-income neighbourhoods. Then again, Wang and Li (2016), and Xian et al. (2022) did not argue that the spatial distance is the problem, rather the lack of mixing in public spaces.

Moving on from the social dimension, several ecological issues can be highlighted. For example, the incredible pace at which Hong Kong constructed public housing posed some sustainability problems. In 1973, the government estimated that about 1.5 million people required affordable housing. The government set out to provide adequate housing for the entire low-income population within ten years. In 1985, after intense new town development, 1.7 million people lived in new towns. In the first years, an average 35,000 apartments were constructed each year. Though an incredible feat, this proved to be a breakneck pace, as the building quality suffered. Many of the housing blocks had to be renovated or demolished for reconstruction. In December 1985, 26 public housing blocks were declared too dangerous to live in due to construction flaws (Wang & Yeh, 1987). The introduction of prefabrication greatly improved construction quality and subsequently reduced maintenance costs. Moreover, the production rate could now be increased to 50,000 flats per year (Law, 1998).

Another issue is the lack of trees in the new towns. As seen in LEED ND, Hong Kongese streetscapes contain significantly less trees than Singapore's. Jim (1998) explains that the limited availability of land for development in Hong Kong has resulted in a lower priority for trees relative to other cities. The intensive land-use further increases the competition for space between trees and other uses. As a result, several conflicts arise. The need for inexpensive developable land for the new towns instigated the reclamation of shallow bays. Reclaimed land was intensely used and left inadequate space for trees. Moreover, infill projects and road improvements damaged existing trees and further removed existing greenery and available planting spaces. Likewise, the rise in underground utilities has further increased the conflict for space and prevents the planting of new trees. When underground utilities are placed, substantial root damage often occurs (Jim, 1998). This explains the evident lack of trees in the Hong Kongese streetscape.

Lastly, construction in vulnerable areas should be avoided according to the NUA. However, land reclamation formed a major part of new town development. While land reclamation was the fastest way to increase Hong Kong's developable land area, it is not without environmental consequences. Ma (2014) explains that the government's land reclamation policy was biased towards property development and increasing government revenue with land sales. Yet, reclamation had a significant negative impact on the environment. Issues include the release of contaminants by dredging, the pollution of the surrounding water and air, the irreversible damaging of the coastline, and the disruption of the marine ecosystem (Ma, 2014). This also coincided with the decline of otter populations (Hui & Chan, 2024). Fortunately, with the rise of civil society and environmental interest groups, the government was forced to adopt a more bottom-up approach. As a result, land reclamation practices have been halted (Ma, 2014). The next paragraph delves deeper into the government's financial plans and incentives.

5.3 Financial plans

Financial plans are the third and final foundation for urban policies. The lack of financial means for urban investments is what inspired this research in the first place. The New Urban Agenda stresses that municipal finance can use the value generated by urbanisation to sustainably finance the costs of urbanisation. By capturing land value increases, the wealth can be expanded and shared by investing in increasingly higher quality of urbanisation. Through sustainable finance and a sufficient flow of resources, a virtuous financial cycle can be created. In addition, good urbanisation plays an important role in improving a city's competitiveness. By providing a spatial layout that allows businesses to grow and develop, opportunities and access to jobs and wealth increases. This reenforces the local economy (Clos, 2016). Capturing land values is done through a system of public leaseholds in

Singapore and Hong Kong, among other instruments. This paragraph explores the financial plans of these cities to see if and how sustainable urbanisation was financed.

5.3.1 Singaporean long-term planning

In an interview, Dr. Liu Thai Ker, former Singapore Master Planner, said the following: “We managed our country like a company. We almost never wasted anything. That’s how we lifted ourselves from poverty to become a relatively wealthy nation” (Editorial Team, 2017, p. 96). Dr. Liu was the chief architect and CEO of the HDB from 1969 to 1989. He oversaw the construction of two dozen new towns, including Ang Mo Kio, Bedok and Clementi. As former Master Planner, he mostly talks about the merit of having a master plan that considers the long-term needs of the country. It allows for good spatial planning and the reduction of environmental impacts down the line. However, Dr. Liu also describes how the Singaporeans approached infrastructure as an investment. The government would only invest in infrastructure where it would get a return. To do so, infrastructure was developed in relation to the pace of urbanisation. Once the facilities were built, the government could immediately get a return in the form of water usage rates, electricity rates etc. This meant they did not waste any money, but also that new towns were adequately provided with infrastructure. The returns also allowed for further investments. In more remote areas the HDB opted for septic tanks and electrical substations as a temporary solution. As a result, squatters could move into appropriate housing and environmental pollution was prevented while saving money on expensive infrastructure. The infrastructure would be upgraded when it made financial sense. Dr. Liu describes this approach as being very business-like (Editorial Team, 2017, p. 96). The population size of new towns was also determined by financial reasons. In the late 1960s, around the time that Ang Mo Kio was developed, a common size for European new towns was about 120 thousand people. Singaporean new towns, on the other hand, were much larger at about 200 thousand people (Clementi being an exception). This was because a much higher population was needed to sustain essential facilities in the developing country (Liu et al., 1983). This might have had negative results on the LEED ND performance. On the other hand, LEED ND mostly takes the density of amenities into consideration rather than their capacity.

When it comes to financing the public housing programme, the HDB receives several sources of revenue. Phang and Helble (2016) distinguish three forms of support: (1) annual grants from the government budget to cover development, maintenance, and upgrading of estates; (2) government loans for HDB mortgage lending schemes to residents and for long-term development purposes; and lastly (3) land allocation for HDB housing and new town developments. The last form of support was discussed previously in relation to the Land Acquisition Act. Regarding the grants, Tyabji and Ching (1989) explained that the HDB never lacked funding as ample was available from the government budget. Since the formation of the HDB, public housing has consistently been granted top priority. Requests for fund for the public housing programmes were always approved by the. Most government revenue came from taxes. Here, the effects of Foreign Direct Investment should not be ignored. FDI fuelled Singapore’s rapid economic growth, which resulted in the expansion of the tax base. This, despite the progressive reduction of income tax rates. Tyabji and Ching (1989) speculate that if FDI had been lower, less resources would have been available for the public housing programme. Combining this notion with the insights from Jacobs and Cairns (2008), Johnson (2008), and Schenk (2004), this seems to paint a picture of a virtuous cycle of new town development attracting FDI, and FDI indirectly financing further new town developments.

Besides the financing of new town development, it is also interesting to consider how Singaporeans finance their purchase of public housing flats. Purchases are supported low-interest through subsidised prices on new construction, grants to the lower-income households, and HDB mortgages (Fainstein, 2012). Government loans make the HDB mortgages possible. Buyers of HDB leasehold flats (both new and resale) can get a mortgage up to 80% of the price of the property. The maximum repayment period is limited to 25 years. The remaining 20% can be funded through the Central Provident Fund (CPF) (Phang & Helble, 2016). The CPF is unique to Singapore. Both employers and employees

contribute a certain percentage of the employee's monthly salary toward the employee's personal CPF account. In 1955, when the CPF was established, the contribution rate was 5% for both employers and employees, totalling a 10% of the monthly salary. The money in these accounts can only be used for specific government-approved purposes (Tyabji & Ching, 1989). In 1968, a new law was introduced which allowed for the use of CPF to finance the purchase of housing. From then on, CPF contribution rates increased gradually. By 1984, employers and employees have to contribute 25% of the monthly salary towards the CPF (Phang & Helble, 2016). Contribution rates change in accordance with the economy and have since dropped to 20% for employees and 17% for employers by January 2025, up to a ceiling of S$7,400 per month (CPF Board, 2024).

The HDB began offering leasehold housing units for sale from 1964 under the Home Ownership Scheme. The nonprofit public housing scheme aimed for ownership especially among lower- and middle-income groups. However, this scheme was not necessarily about equal house purchasing opportunities. Rather, it was seen by the government as an investment into the political stability of the nation. Firstly, then Prime Minister Lee Kuan Yew believed that homeownership would give citizens a stake in the country. A sense of ownership that promotes social and political stability (Kee, 2023; Tyabji & Ching, 1989). Secondly, the government used the resettlement programme that accompanied urban renewal and new town development to break up racial enclaves. It was previously mentioned that the HDB has maintained an ethnic balance within housing blocks ever since 1989 (Fainstein, 2012; Phang & Helble, 2016). Ever since a series of ethnic violence between the Chinese and Malays in 1960s, racial harmony has been a top priority in Singapore. By breaking up the existing enclaves and carefully allocating public housing, Singapore aims to achieve an integrated society, and in turn long-term social and political stability (Phang & Helble, 2016; Tyabji & Ching, 1989). Then Deputy Prime Minister, now President of Singapore, said in an interview that "the most intrusive social policy in Singapore has turned out to be the most important" (St. Gallen Symposium, 2015). Therefore, it can be said that Singapore not only invested in sustainable physical infrastructure, but also in sustainable social infrastructure.

5.3.2 Hong Kongese land revenues and private investment

Hong Kong also viewed public housing as an investment in stability. Sir Murray MacLehose, governor of Hong Kong in 1972, believed that providing low-cost housing for needy citizens would result in social stability. Moreover, he believed that development of new towns would increase employment and stimulate consumption, fuelling economic growth (Hui & Wong, 2004). The Housing Authority (HA) was created in 1973 is to this day responsible for the development of public housing. It has been financed through various ways as funding changed over time. Between 1973 and 1988, it was financially supported by the government through the government budget, direct injections of capital, and indirect subsidies of land. Being the sole landowner in the territory, the government granted land to the HA without any premium. Rental income from properties formed another source of revenue (Das, 2021; Hui & Wong, 2004; Zhang, 2017).

In 1988, the HA became a self-financed institution, and the financing of public housing underwent a significant change. That year, the Authority received a lump sum of capital from the government. Besides that, it had to rely on private sources of income. Income from rental properties yielded a substantial amount. Remaining funds were raised by the sale of Home Ownership Schemes, as well as commercial and industrial properties. Commercial spaces on its public housing estates were also leased at near-to-market prices (Das, 2021; Hui & Wong, 2004; Zhang, 2017). Over the years, the HA accumulated a massive asset of commercial properties (Chiu, 2010). This is the self-contained housing estates in new towns provided a variety of amenities for the residents, including commercial complexes. Unintentionally, the rental income from commercial properties became an effective and regular source of income which helped compensate the deficit from the subsidised residential rents.

The next significant change occurred in 2001, when the Home Ownership Scheme was ended. Up to this point, the lucrative sale of subsidised homes had covered the rental subsidies. It was decided that the Housing Authority would sell most of its retail properties and car parks. A special company was set up for the purpose of owning and operating these properties. The proceeds from the sale were used to generate investment income for the HA. Before the sale, the income from commercial properties was split evenly between the Authority and the government. The government agreed not to claim for the loss of revenue caused by the sale. To cut down costs, the HA also streamlined and minimised its staff (Chiu, 2010). So, the government has not injected capital into the public housing sector ever since the HA's financial independence in 1988. This goes to show the financial sustainability of the HA. That being said, landownership was a crucial aspect of the programme. Subsidies of free land continued to be huge. If the HA would have needed to acquire the land at market prices, the public housing programme would not have been feasible (Chiu, 2010). Nevertheless, the success of the HA in creating affordable housing along with the amenities it provides has positively impact the LEED ND scores.

Landownership also proved to be crucial to generate revenue for public infrastructure investment. Hong (1999) found that for the period 1970 to 1997, the government captured on average 39 percent of land increments through land leasing. Combined with other land-related revenues, 79 percent of the annual costs of public infrastructure investment was recovered. However, land leasing did not come without problems. The Hong Kongese government has become reliant on land revenues. This financial interest in land conflicts with its public role in stabilising land prices. Since it has been proven difficult in Hong Kong to demand premiums for lease renewals, the government relies heavily on initial land premiums. Moreover, acquiring leased land comes with high negotiation costs, as most land leases have multiple leaseholders. This deters private developers from land redevelopments, which limits the government's ability to recoup land value through premiums for lease modifications. Lastly, only a nominal amount of land rent was charged for Crown Leases. The dependence on initial premiums for land leases has created a perverse incentive. If the government were to lease land when land values are low, it would not be able to capture the increased land values later. To maintain government revenues, land value needs to be retained. This can only be done if land for private development is slowly released. The tight restriction on land supply have consequently encouraged private land banking and property speculation. As a result, private property is among the most expensive in the world (Hong, 1999). This has severe implications for residents, who must pay increasingly higher rents. The government's reliance on initial premiums does not seem a sustainable financial strategy. It is unfortunate that the other value capture instruments are underutilised.

When it came to the development of the mass rapid transit system, Hong Kong employed a unique financial strategy. Even in a high-density city like Hong Kong, relying solely on fare revenues is not enough to cover the costs (He et al., 2018). Since the 1980s, a model for rail-plus-property development has been applied to fund mass rapid transit. The Mass Transit Railway Corporation (MTRC) was created in 1972 as a public entity responsible for the operation and maintenance of the rail network. However, it was also allowed to acquire, hold and dispose property, as well as to improve, develop or modify any property. It formed the basis for the MTRC to act as developer and site manager. This set it apart from other traditional railway corporations. In 1979, the government published a new policy on internal transport which banned direct competition between the MTRC and other modes of transport. This was done to guarantee ridership and secure the return on rail invest. The policy also forced bus companies to align their schedules with those of the MTRC. Despite this support, the MTRC did not include property development with its first lines, as it did not have the necessary expertise. The first rail-plus-property development started in 1986 and the strategy been the norm ever since (Jauregui-Fung, 2022).

It works as follows. The government initiates railway development by identifying a location. Then, the MTRC prepares a master plan for the station and the development of the surrounding area. The development can include both residential and commercial properties. When the master plan is approved, the construction of the station and the railway is done by

the MTRC. For the surrounding area, private developers can obtain development packages through public tender. The winners are responsible for the construction, selling and leasing of the properties in these packages. Profits from the completed properties are shared between private developers and the MTRC. This model has several advantages. The added revenues from property development cover the cost of the rail service and leaves a net profit to be invested in further expansion of the network. Revenues come from the land premiums paid by the private developers and the rent of properties. From a planning perspective, this combination with property development allows for the full realisation of the economic benefits of railways. However, MTR developments have also been criticised for raising the price of residential properties up to 30% in the area (He et al., 2018). This led He et al. (2018) to study the social (in)justice of the system. Fortunately, they concluded that lower income groups are not excluded from MTR benefits, as housing estates in the vicinity of MTR stations included a mix of public housing. In fact, public housing is more prevalent than private housing in the case of stations constructed before 2000. Since then, the ratio between the wo have become more balanced. Therefore, no spatial injustice was observed (He et al., 2018).

6 Discussion

This chapter is a discussion on the findings and the method. The chapter starts with a summary of the key results. Then, the limitations of the method and therefore the results are explored. Especially since the LEED ND framework required some creative solutions to make it fit to an Asian context. Lastly, the recommendations for further studies are presented.

6.1 Key findings

The LEED ND assessment indicates that the six new towns under study perform well in categories related to transit, availability of jobs and affordable housing, compact development, diversity of amenities, housing diversity, parks and recreation, and access to schools. On the other hand, the new towns have a hard time satisfying ecological concerns, walkability, intersection density, local food production, and community participation. Especially the lack of imperilled species protection at the time of development and the low intersection density in the new towns today means that none of the six new towns could receive LEED ND certification, since these are a prerequisite for sustainable neighbourhoods. There are some noticeable differences between the cities of Singapore and Hong Kong. Except for compact development, Singaporean new towns perform equally or better than the Hong Kongese ones. New town performances are quite similar within cities, as some aspects of the LEED ND assessment are determined by citywide policies. Moreover, the new towns under study represent the design philosophy of a particular generation, which further explains their similarities. Using the framework for sustainable urban development by the NUA, an explanation for the performance of the new towns was sought in the cities' urban policies.

Singapore's and Hong Kong's history as a British colony meant that their property laws and planning practices have been largely adopted from Britain's. However, there were some differences in rules and regulations between the countries. A major difference is that the Hong Kongese government has always owned all land in the territory since becoming a British trading post. Singapore, on the other hand, owned only a small part of its territory when it gained independence. The powerful Land Acquisition Act allows the Singaporean government to acquire land for public development. Moreover, it prevented speculation. Secondly, government institutions played key parts in new town development. The HDB was solely responsible for the planning and physical construction of new towns. Only after completion, public infrastructure was handed over to their respective government agencies. This strict control ensured the provision of essential facilities and avoided market failure. Most importantly, the capture of development gains was guaranteed for the public, partially thanks to the public leasehold system. The Singaporean government also greatly interfered with the development of the construction industry. The HDB had its own R&D department to develop essential construction technologies, such as elevators. Hong Kong had a much more liberal and less centralised approach. Multiple government agencies were responsible for new town development, and private investments played a large part. Public housing had a high priority and was quickly constructed. Departments building schools and other infrastructure had more priorities, which resulted in a slow provision. The government's inadequate provision of necessary infrastructure and facilities discouraged vital private investments in industry and housing. Due to a lack of buildable land, Hong Kong relies on land reclamation. However, ecological legislation was absent at the time, resulting in several ecological issues. A lack of government interference also created a financing deficiency for the construction industry, which meant that traditional building technologies remained prevalent in the private sector. When it comes to public housing, both countries make ample use of prefabrication to increase building quality and speeds.

The former colonies are also inspired by the British urban design. New towns had to be self-contained and balanced. Daily life should be able to take place within the boundaries of the new town. Social engineering also occurred. To promote social stability, the HDB maintains an ethnic balance in its housing estates to encourage the integration of different

social groups. In addition, different appartement sizes are mixed to induce social cohesion. The garden city design was implemented to attract tourists and, most importantly, Foreign Direct Investment. Urban design was also pragmatic. Buildings were oriented in relation to the wind and sun. This resulted in a loss to the human scale, represented in LEED ND as the building-height-to-street-width ratio. Lastly, another major contribution to the success of Singaporean new towns was long-term planning. Before the government could afford it, plans were already drawn for the mass rapid transit system. Land was acquired in advance and the space was reserved. Once they could afford it, the MRT was developed. Urban design in Hong Kong results in a high demand for space. Green belts around the city exaggerate the extreme densities in urban centres. This limits the available space for trees within the city, as it conflicts with other interests. The dense development also increases the urban heat island effect. Climate-sensitive planning is thus required. Public housing estates for low incomes and private housing estate are separated. This resulted in new towns being unsuccessful at attracting private homeowners due to their low-income image. Moreover, research seems to indicate that Hong Kongese urban design results in segregation. Different socio-economic groups live in separate estates and visit different public spaces, which limits their interactions.

The contrast between the far-reaching government involvement and the more liberal approach extend to the financial plans. The HDB was financed through annual grants. Grants were funded by taxes. However, as urban renewal and new town development attracted FDI, the economy grow and the taxbase expanded. As a result, FDI indirectly financed further new town developments that again attracted more FDI. Homeownership for all was financed through HDB loans and the Central Provident Fund, a mandatory savings account for citizens. Both Singapore and Hong Kong saw their public housing programmes as investments into political and social stability. However, the Hong Kongese government turned the Housing Authority into a self-financed institution after fifteen years of funding. Nevertheless, free land grants from the government for public housing remained crucial. Moreover, the combination of property development and transit has proven quite lucrative, financing public transport and leaving a net profit to be invested in further expansion of the network. The government's control over public housing ensures that spatial injustice is prevented. MRT benefits are also available to low-income groups. Lastly, the Hong Kongese government also possesses over several land value capture tools. Unfortunately, most of them are employ unsuccessfully. As a result, the government has become dependent on initial land premiums, which creates a perverse incentive. To maintain land values, land for private development is released slowly. As a result, private land banking and property speculation is encouraged. In theory, land value capture should be preventing this.

6.2 Limitations of the method

There were some notable problems and questions that arose during the LEED ND analysis of the new towns. These can potentially limit the quality of the results. Firstly, some problems arose with the LEED ND definition for circulation network. As explained in the methodology, rather than analysing every single street, three representative types of streets were selected and analysed. I looked for a main road, secondary street, and tertiary street. The circulation network of Ang Mo Kio is characterised by avenues and streets that are numbered rather than named, e.g. Street 22. Initially, Avenue 3, Avenue 4 and Street 22 were picked for the analysis. Avenues can be seen as the main roads, and the streets as "secondary street". I could not find any tertiary streets. There are some smaller paths for roads, but these are not named on maps, not visible in Google Street View, and closed to the public by barriers. Perhaps most importantly, they were even left off some official government maps. These are usually the streets that lay in between the apartment blocks, along with parking spaces for the residents (see Figure 6.1). Though located on these tertiary streets, addresses are usually connected to the avenues and streets near them.

The LEED ND framework defines circulation network as follows: "all motorized, nonmotorized, and mixed-mode travel ways permanently accessible to the public, not including driveways, parking lots, highway access ramps, and rights-of-way exclusively

dedicated to rail." This definition posed a problem, as most examples of tertiary streets that I could find did not seem to be accessible to the public due to the barriers. This limited me to the avenues and streets. However, avenues and streets score rather poorly in the LEED ND framework. Their building-height-to-street-width ratio is often too low. Most buildings do not face the streets but are perpendicular to them. Since there are so few buildings that face the streets, there are also few building entrances, and buildings often exceed 7,5 meters distance to the street. All these factors lower the LEED ND score. Moreover, avenues and streets are not representative of all places in Ang Mo Kio. I solved this issue by using the town centre as a tertiary street. Since it is lined with shops, it allowed me to access the Walkability. This strategy was repeated for the analysis of Bedok and Clementi, where I also picked an avenue or road, a street, and a pedestrian shopping area.

Figure 6.1 Apartment block 127 (top-centre) is addressed 127 Ang Mo Kio Ave 3, while the one-way street which it faces is unnamed.

Another problem arose with the definition of intersections. According to the results, all six new towns have such a low density of intersections that they are unable to score any points in this category. However, the only intersections that I counted towards this score were of motorised travel ways. If the goal of a higher intersection density is to promote more physical activity and other modes of transportation (i.e. biking and walking), then intersections between non-motorised paths should also be counted. Hong Kong knows many alleys that are only traversable by foot, bike or moped. Additionally, the city has many elevated walkways. Singapore has streets with dead ends for cars, however, that continue as foot and bicycle paths. Groups of apartment complexes are also often connected by paths (see the red and blue dotted lines in Figure 6.1). For the analysis, I have chosen to neglect these types of intersections and focus only on street intersections. However, intersection densities would increase if intersections with non-motorised pathways were also counted. It is unclear whether this would have made a difference in the LEED ND scores.

Sometimes there was a cultural difference between LEED ND categories and the local practices. The NPD Credit for Housing Types and Affordability has the aim to promote

socially equitable and engaging neighbourhoods by enabling residents from a wide range of economic levels, household sizes, and age groups to live in a community. This credit deals with the diversity of housing types which is worth three points. The project must include a sufficient variety of housing sizes and types. This is calculated using the Simpson Diversity Index. The total variety of housing within the project must achieve a score greater than 0.5. If the score is greater than 0.7, the project receives three points. The Simpson Diversity Index calculates the probability that any two randomly selected dwelling units in a project will be of a different type. For the calculation, the housing categories from Table 6.1 must be used. However, these categories posed two problems for the analysis. Firstly, there was no data available about Singaporean and Hong Kongese housing that could be fitted into these categories. Secondly, when calculating this score for the Singaporean case, these categories make little sense. As explained in Chapter 5, the HDB builds five different flats, namely the one-, two-, three-, four-, and five-room flats, with sizes ranging from 33 to 135m2 (Liu et al., 1983). Table 6.2 shows the categorisation of housing types by the Singaporean Department of Statistics. For the calculation of the Simpson Diversity Index, I have chosen to use this categorisation, since it makes the most sense in the cultural context of Singapore.

Type	Square meters
Detached residential, large	> 116
Detached residential, small	≤ 116
Duplex or townhouse, large	> 116
Duplex or townhouse, small	≤ 116
Dwelling unit in multiunit building with no elevator, large	> 116
Dwelling unit in multiunit building with no elevator, medium	> 70 to ≤ 116
Dwelling unit in multiunit building with no elevator, small	≤ 70
Dwelling unit in multiunit building with elevator, 4 stories or fewer, large	> 116
Dwelling unit in multiunit building with elevator, 4 stories or fewer, medium	> 70 to ≤ 116
Dwelling unit in multiunit building with elevator, 4 stories or fewer, small	≤ 70
Dwelling unit in multiunit building with elevator, 5 to 8 stories, large	> 116
Dwelling unit in multiunit building with elevator, 5 to 8 stories, medium	> 70 to ≤ 116
Dwelling unit in multiunit building with elevator, 5 to 8 stories, small	≤ 70
Dwelling unit in multiunit building with elevator, 9 stories or more, large	> 116
Dwelling unit in multiunit building with elevator, 9 stories or more, medium	> 70 to ≤ 116
Dwelling unit in multiunit building with elevator, 9 stories or more, small	≤ 70
Live-work space, large	> 116
Live-work space, small	≤ 116
Accessory dwelling unit, large	> 116
Accessory dwelling unit, small	≤ 116

Table 6.1 LEED ND housing categories (USGBC, 2018)

HDB Dwellings	Free market dwellings
1- and 2-Room Flats	Condominiums and Other Apartments
3-Room Flats	Landed Properties
4-Room Flats	Others
5-Room and Executive Flats	

Table 6.2 Singapore Department of Statistics housing categories (Singapore Department of Statistics, 2023)

In the case of Hong Kong, there is very little data available on housing. Population densities are calculated based on the entire land area of the new towns, despite large regions being uninhabited due to the mountainous terrain. This means that the densities are often underestimated. Additionally, data on flat sizes is hard to find. This posed a problem when analysing the diversity of housing types. The figure below shows some data from the Hong Kong Housing Authority and their stock of public rental housing (PRH) and home ownership scheme (HOS). These numbers are based on the whole city. Some additional data is available on the total number of PRH and HOS flats per new town. This allowed me to estimate a Simpson Diversity Index score of 0,68 for the PRH and 0,70 for the HOS. Another estimate, where I combined the flats smaller than 40 m^2 and the PRH >40 and HOS 40-49.9, provided a diversity score of 0,65 (for the whole city).

Some choices had to be made when deciding the definitive score for this credit. The flat sizes in the figure below are rather small and the categories are much narrower than the ones found in the LEED ND framework. However, I assume that each extra 10 m^2 represents an extra room, therefore being similar to the Singaporean room-system. Furthermore, this categorisation must be regarded useful or representative in some way to the Hong Kong Housing Authority. For these reasons, I am willing to maintain this categorisation, despite the small sizes. The diversity score is lower for the PRH, making it a more conservative bet. Furthermore, public rental housing makes up a larger proportion than HOS flats in all three new towns. Due to the lack of further information on private permanent housing, and the lack of transparency in the numbers, I opted to reward all new towns 2 points, as I approximated that the diversity score would fall somewhere between 0,60 and 0,70.

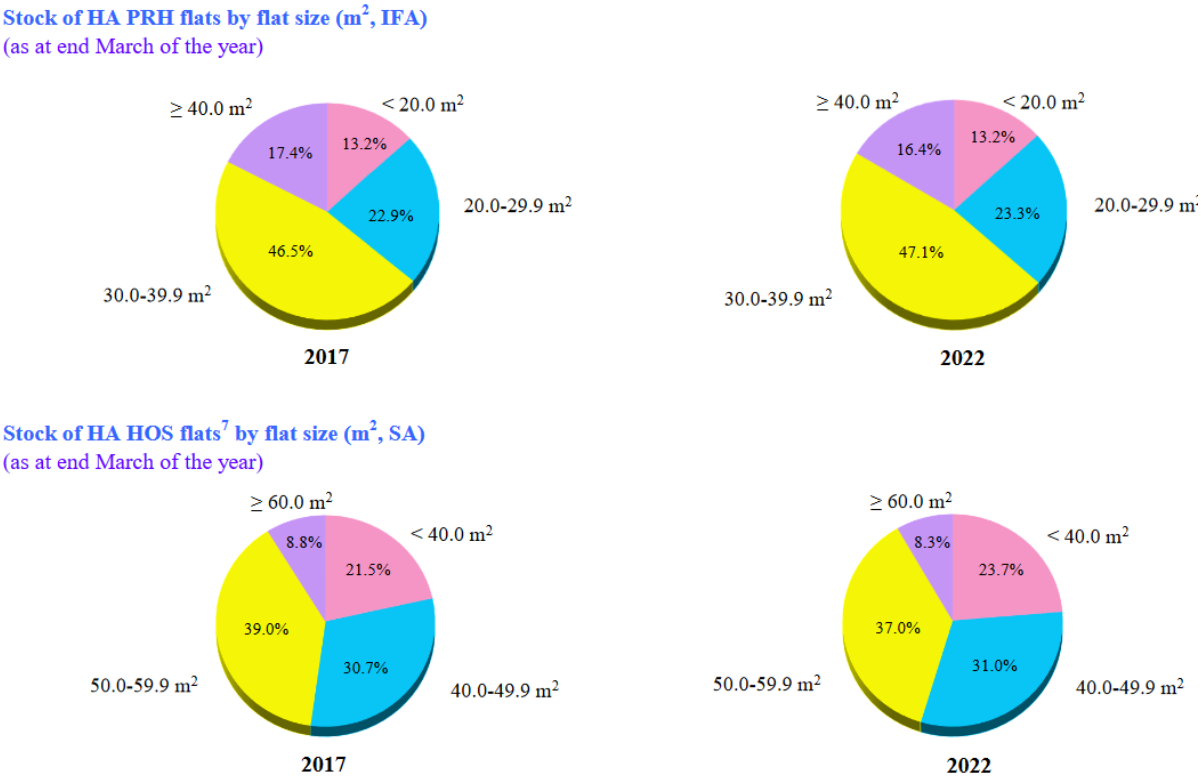

Figure 6.2 Hong Kong flat size ratios (Housing Bureau, 2022)

Lastly, land reclamation is not mentioned in LEED ND, while it is widely employed in both Singapore and Hong Kong. The practice of land reclamation has been criticised for its impact on the natural environment (e.g. Hui & Chan, 2024; Van Dijk & Weitkamp, 2018). LEED ND presented one possible path. The SLL Prerequisite for Wetland and Water Body Conservation aims “to preserve water quality, natural hydrology, habitat, and biodiversity through conservation of wetlands and water bodies” (USGBC, 2018). When construction

sites have sensitive areas, developers must meet GIB Credit Rainwater Management. However, rainwater management seems like an inadequate replacement for the environment loss caused by land reclamation. To illustrate my point, take the example of Southeast Asia which known for its mangroves (see Figure 6.3) (Fauzi et al., 2019). Clementi used to have mangroves lining its coast. Replacing them with rain barrels as proposed by the GIB credit seems insufficient to me. Similarly, Hong Kongese land reclamation led to e.g. a decline in otter populations (Hui & Chan, 2024). I have taken the freedom to mark the prerequisites for water conservation as insufficient for these new towns, even though it is not necessary part of the LEED ND assessment.

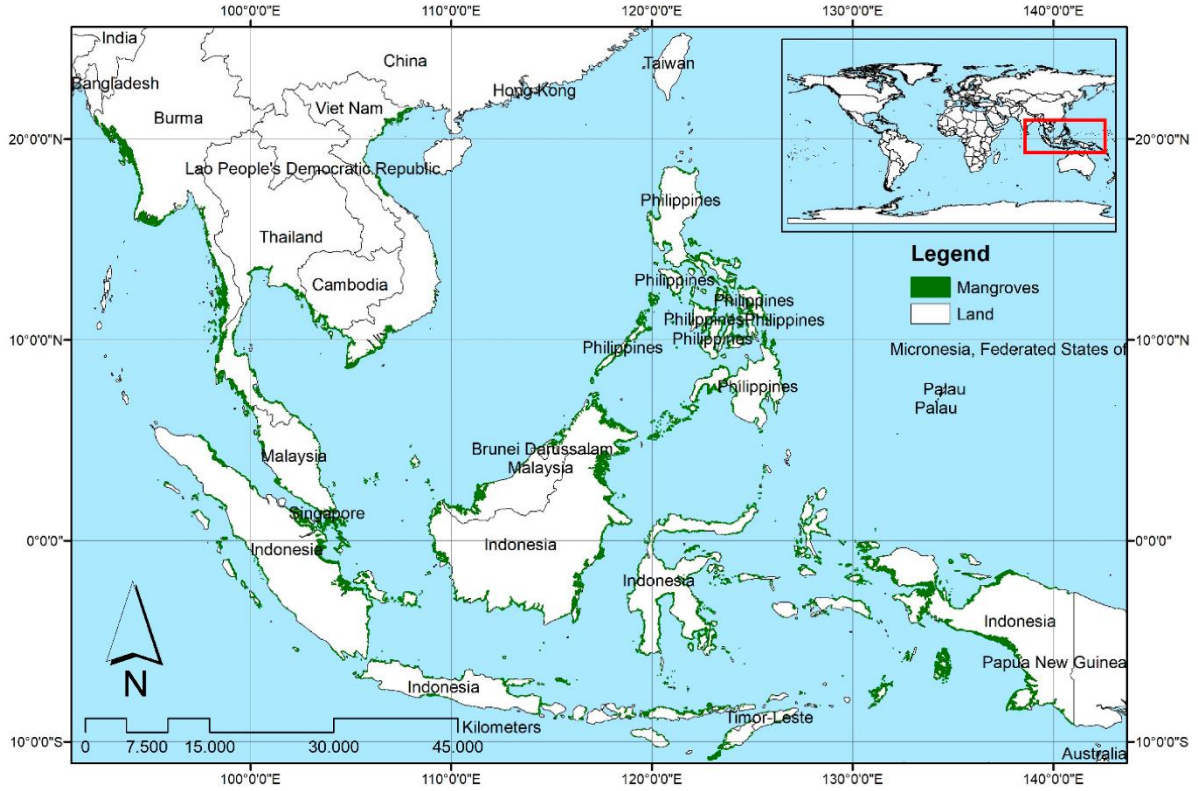

Figure 6.3 Mangrove forests in Southeast Asia (Fauzi et al., 2019)

6.3 Recommendations for future research

For future research I recommend further developing the LEED ND assessment. As of yet, LEED ND is designed to evaluate sustainable neighbourhood development in North America. This caused some issues when I applied it to another context and culture. The aim of further developing it would be to create an assessment framework for scientific purposes that could be applied to neighbourhoods all around the world. This could be achieved by for example using more general descriptions of categories, allowing the researcher to interpret them as needed. Perhaps a supplementary manual for the scientific use of the existing LEED ND assessment would proof to be enough, with added or altered definitions. Of course, the improved assessment should not stray too much from the original if current scores are to stay comparable to future scores.

Secondly, as indicated in the methodology, I chose against conducting interviews due to time constraints. However, to improve validity and the triangulation of the findings, interviews could be conducted with local experts. This might shed some light on some of the more obscure topics in this thesis, such as intersection density. My best guess is that, in the case of Singapore, intersection density is low as it follows the modernist ideals outlined by Le Corbusier. This resulted in an urban design that I recognise to represent “towers in the park”. An interview could confirm this suspicion.

7 Conclusion

The aim of this research is to explore the potential and limitations of public land leasing in balancing planning goals such as equity and sustainability. The research includes an evaluation of the public leasehold policy, as well as an evaluation of how this policy has been implemented in terms of the spatial arrangements and its impact on social outcomes. It entails an assessment of how (1) the rules and regulations, (2) the urban design, and (3) financial plans came together. This research aim is translated into the following research questions:

What can be learned from the Singaporean and Hong Kongese public leasehold system applied in an equitable and sustainable manner during times of rapid urbanisation? To

- What is the sustainable performance of Singaporean and Hong Kongese new towns built during their periods of rapid urbanisation?
- How can these performances be explained, considering the rules and regulations, urban design, and financial plans that make up the urban policies of these cities?
- What recommendations can be made for developing countries considering employing a public leasehold system?

Starting with the first sub-question, the sustainable performance of Singaporean and Hong Kongese new towns is insufficient, as they failed several prerequisites. The lack of environmental legislation for the protection of imperilled species was an issue in all six new towns under study. Connectivity also left something to be desired as intersection densities were too low. Apart from the prerequisites, the new towns seem to score highly on categories related to housing, amenities, and density. On the other hand, they perform poorly regarding ecological and communal aspects. Overall, Singaporean new towns performed equally or better than Hong Kongese ones.

These performances can be explained by a variety of urban policies. The Singaporean approach to regulations, urban design, and finance is characterised by far-reaching government interference, whereas Hong Kong had a far more liberal approach. The strict control by the Singaporean government guaranteed the quality of new town development. The Land Acquisition Act prevented speculation, essential facilities were provided on time, and social engineering promoted integration and fostered political stability. Moreover, the housing programme successfully capture land values. Hong Kong's less centralised approach has left room for mistakes. Essential private investment was discouraged by the slow delivery of infrastructure. Moreover, the massive housing estates that separate low-income households from other ones induced segregation. Lastly, despite owning all the land in the territory, the government is unable to capture land value increments. The instruments designed to do so are underutilised. Due to its dependency on initial land premiums, the government has an perverse incentive to inflate land values by restricting land leases, which in turn encourages private land banking and speculation.

The Singaporean and Hong Kongese approaches to new town development differ in significant ways. Still, both managed to develop their construction industries in such a way that they were able to execute their new town programmes. Therefore, I would recommend other developing countries to assess their situation and to base their approach on that. If capital is readily available and the banking sector is relatively mature like Hong Kong's was, perhaps a more liberal approach suffices. However, if capital is lacking and unemployment is high like in Singapore's case, more government intervention could be useful. In either case, owning public land is crucial if a developing country today also wants to replicate the Singaporean or Hong Kongese public housing programmes. If the government does not yet possess land, powerful land acquisition legislation is recommended. Regarding social aspects, some level of segregation prevention is recommended, as it builds more stable societies. In the case of environmental sustainability, plan for future transit systems, even if funds are not available today.

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