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Urban fringe land use transitions in Hong Kong: from new towns to new development areas

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Abstract

Land in urban fringe area is the primary source for land supply and development. In Hong Kong (HK), nine new towns have been built in New Territories since 1970s, providing 172.6 km² built-up land and large amount of residences for 3.4 million people. However, due to land scarcity, development restriction, and social opposition, New Development Area (NDA), as the small-scale extension of New Town (NT), was designated as one of the main approaches for HK medium and long term land supply. To demonstrate the characteristics of urban fringe land use transitions in Hong Kong, literature review and case study were used in this research. The history of new town development and the scheme of new development areas were introduced firstly. Afterwards, the land use features of NT and NDA were compared and the case of Hung Shui Kiu NDA was illustrated. It is concluded that while housing, infrastructure and facility were the main elements in NTs, employment, vibrancy and environment were suggested to be the new compulsory elements in NDAs integrated to the traditional planning concepts. As for the development approach, lease modification was adopted in NDA to allow private landowners directly develop their land, in addition to the traditional development approach of land resumption in NT. It is suggested to ensure the development of NDA, the proposed development plan should be persuasive to provide the optimal land use distribution as a trade-off among the profits of developers, the interests of local villager, government concern and the provision of land for future residents. Also, community engagement will play a more important role in NDA planning process. Referring to the analysis of urban fringe land use transitions and strategies for planning and development, the study would also be helpful to others growing cities.

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1. Introduction

Land supply in Hong Kong (HK) has been highly concerned and discussed in a long term. Due to its limited land development resource and dense population, new built-up land has been required and provided in various ways, such as reclamation, New Town (NT) development, urban renewal, brownfield revitalization, etc., among which the new towns developed in urban fringe areas contributed most land supply in the last decades. The New Town Development Programme in Hong Kong initiated in 1973, targeting to provide public and private housing for millions of people supported by essential infrastructure and community facilities. Nine new towns were developed in three generations. Tsuen Wan, Sha Tin and Tuen Mun started works in the early 1970s as the first generation, the second of Tai Po, Fanling/Sheung Shui and Yuen Long in the late 1970s, and the third in the 1980s and 1990s, including Tseung Kwan O, Tin Shui Wai and Tung Chung. The population of these nine new towns was 3.47 million in 2016, and it is expected to rise to 3.63 million in 2021. [1] However, due to land scarcity, development restriction, and social opposition, new town project has not been proposed since 1990s, instead the New Development Area (NDA), as the small-scale extension of NT, was designated as one of the main approaches in 2007 for HK medium and long term land supply.

From new towns to new development areas, it indicates land use transitions in the urban fringes of Hong Kong. According to “2007-08 Policy Address” [2], three features of NDAs were identified. Firstly, smaller scope in less than one fourth of the existing new towns such as Tuen Mun and Sha Tin; secondly, land supply for various uses such as housing, employment, high value-added and non-polluting industries; and thirdly, provision of quality living space and convenience to both residents and users. Compared with the targets of houses, infrastructure and community facilities in NT, the NDA contains more uses and sustainable planning concepts. However, few research concerned about NDA and its difference from NT in HK. Therefore, this study aims to illustrate how the NDA was planned and to understand how land use was transitioned in the urban fringe of HK.

Background and literatures about NT development and the commencement of NDA were reviewed. The characteristics regarding transition from NT to NDA were then illustrated. The case of Hung Shui Kiu NDA was introduced to illustrate the planning process of NDA and its differences from Tin Shui Wai NT were compared. Regarding the changing situation and new challenges, strategies for suburban land development in HK were discussed, which could also be helpful to others growing cities.

2. Background and Literature Review

Achievements in new town programme were obvious. Supported by essential infrastructure and community facilities, housing supply is the most greatest contribution made by NTs, and public and private housing were provide for millions of people. It was suggested that policy direction, project management approach, planning standards, resource mobilisation, professional input, community support, as well as innovative ideas on design and construction technique contributed to rapid NT development. [3, 4] The area, planned population, current population and planned population density [1] were showed in Table 1.

Table 1. The basic information of NTs in HK

Now Town	Area (hectare)	Planned Population	Population in 2016	Planned Population Density (persons/hectare)
Tsuen Wan	3286	866000	805000	264
Sha Tin	3591	771000	691000	215
Tuen Mun	3266	589000	502000	180
Tai Po	3006	307000	278000	102
Fanling/Sheung Shui	667	290000	261000	435
Yuen Long	561	185000	164000	330
Tin Shui Wai	430	306000	290000	712
Tseung Kwan O	1718	445000	396000	259
Tung Chung*	1075	268000	80000	249
Sum	17600	4027000	3467000	229

*Note: The current planning extension project was included.

However, some issues also appeared in NT development, since it attributed to large-scale immigrations and rehousing. At the beginning of NT construction, social consequences concerning the social integration of people who have been rehoused, the building of relationships and support networks among residents, the psycho-social adjustments of residents, the relationship between residents and the government, etc., were not well attended. [5] Spatially, mismatch between place of residence and place of work and polarization was observed, leading to white-collar jobs concentrated in the older urban areas and blue-collar jobs in the newer towns. [6] The inadequate provision of jobs and schools in new towns also resulted in widespread cross-district commuting between new towns and urban areas. [7] In the study of Tin Shui Wai new town, high unemployment rate and weakened social networks were figured out, indicating the shortages of resettling a high percentage of poor households in a single new town and the lack of access to a wider range of employment opportunities. [8]

Even though the social and commuting challenges were confronted by NTs, population dispersing from urban areas to the suburbs based on the Transit-Oriented Development (TOD) strategy gained favourable comments. [9] Related researches suggested that due to the comprehensive public transportation system and relatively limited use of private cars, the widespread commuting between new towns and urban areas does not lead to severe air pollution and fuel wastage. [10] External transport links served by rail and road links to the urban area and adjacent districts created a sustainable community at the neighbourhood level, with potential for regional balance through alleviating spatial mismatch between NTs and urban areas. [9] Regarding the ongoing enhancement of road links and employment, NTs keep on adjusting to alleviate the persistent population pressure in HK and improve people's living quality.

Since the development of Tung Chung NT in late 1990s, the concept of new town was seldom mentioned, which was related to the population growth in early 2000s. Even though the "Planning and Development Study on North West New Territories" was completed in 2003, the development in suburb was shelved. The negative population growth of 0.2% was even recorded in 2003 (Figure 1), possibly due to the outbreak of the Severe Acute Respiratory Syndrome (SARS).

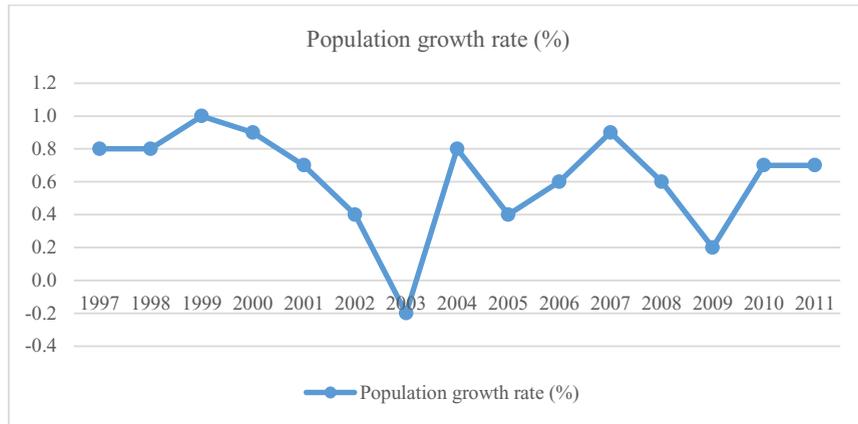


Figure 1. Demographic Trends in Hong Kong 1981–2011 [11]

Until a few years later, the rising land demand pressure on developed areas was paid attention again, and was written in “2007-08 Policy Address” [3] and “Hong Kong 2030: Planning Vision and Strategy” [12] which completed in 2007. Rather than proposing NT to ease the land use pressure in HK, New Development Area (NDA) was mentioned to meet the demand for land arising from population growth. Areas of Kwu Tung North, Fanling North, Ping Che and Ta Kwu Ling and Hung Shui Kiu were targeted for further comprehensive planning and engineering studies.

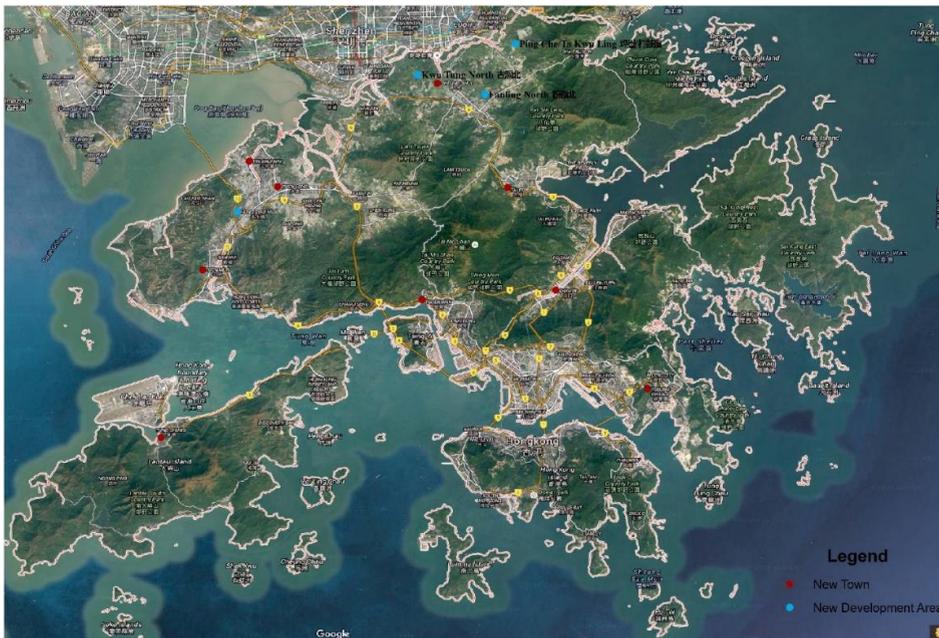


Figure 2. The location of NTs and NDAs in HK
Data source: Google map, manipulated by the authors.

The basic information of the four NDAs in HK was acquired from the official websites of NDA studies [13, 14] and showed in the following table.

Table 2. The basic information of NDAs in HK

NDA	Area (hectare)	Planned Population	Planned Population Density (persons/hectare)	Planning Period	Adjacent NT
Kwu Tung North	477	105500	221	2008~2013	Fanling/S heung Shui
Fanling North	165	71400	433		
Ping Che and Ta Kwu Ling		(Subjected to replanning)			
Hung Shui Kiu	435	160000	368	2011~2016	Tin Shui Wai

The transition from NTs to NDAs implies the changing land development trend in Hong Kong suburban area. To identify the main features in this urban fringe land use transition, land use functions, land development approaches, and planning concepts of NT and NDA were compared, and the case of Hung Shui Kiu NDA were illustrated in the following section.

3. Transition from NT to NDA

3.1 Land use structure and function

Based on the planning and engineering studies, the outline development plan and layout plans will be proposed, in which the land was distributed for different uses. The land use structure reflected the function of the specific area. When developing the new towns, the main objective was to provide houses for increasing population, therefore the residential land use occupied large amount of the built-up land. According to the “2011 Hong Kong Population Census”, the households provided by the new towns were 1.1 million, contributing to 46.4% of the households supply in the whole Hong Kong.

The land use structure of NDAs is related to their surrounding NTs. To compare the land use structure of built-up between NTs and their nearby NDAs, the Outline Zoning Plan (OZP) of TSW (Tin Shui Wai) NT, FSS (Fanling/Sheung Shui) NT, KTN (Kwu Tung North) NDA, and FLN (Fanling North) NDA were collected [13], and also the proposed OZP of Hung Shui Kiu (HSK) NDA [14]. The areas of Commercial zones, Comprehensive Development Area (CDA), Residential zones, Government/Institute and Community (G/IC), Open space, and Industrial zones were extracted from the OZPs [15], and the percentage of these seven land use categories were calculated. In Figure 2, the built-up land structure of the 2 NTs and 3 NDAs were illustrated. It shows that in NTs, the percentages of residential land were much more than those in NDAs, while the percentage of open space and other specified uses were relatively less NDAs. For example, in TWS NT nearly 60% percent built-up area was for residential use, while in HSK NDA the percentage of residential land was less than 30%, reduced by about a half. In FSS NT, the percentages of open space and other specified uses among built-up land were 10.9% and 8.8%. However, open space occupied 16.2% and 27.6% of the built-up land in KTN NDA and FLN NDA, while other specified uses occupied 36.7% and 18.5% respectively.

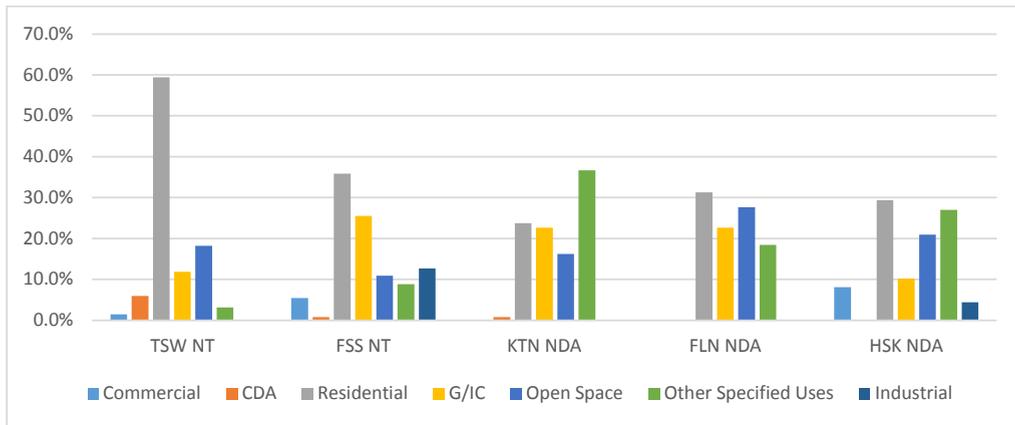


Figure 3. The percentages and structure of main built-up land categories in 2 NTs and 3 NDAs

Regarding the planning issues appeared in NTs, such as the employment unavailability and high residence density, the NDAs are like kinds of remediation to make up these shortages to improve the regional planning and development function. Since the NTs were dominant for residence, more industrial development were considered in NDAs, and the living environment were emphasised in new development, with the provision of more open spaces as an important symbol.

3.2 Development approach of land resumption or lease modification

In new town development, land resumption is an essential and the only approach to obtain the development right, so that the government could sale the land and ensure land supply. There are restrict regulations for land resumption, guiding the resumption process and providing compensation standards. However, another approach for obtaining development right was proposed in the recent planned NDAs, which is lease modification. Referring to some privately owned land, private land owners in new towns were allowed in the past to modify land leases for private developments, while the government was no longer involved in this process, neither resuming nor selling land. The implementation of this lease modification approach was attributed to opposition from some pan-democratic Legislative Council Members who thought the compulsory resumption of private land would deprive the rights of landowners to develop the land on their own. [13]

In the study of KTN and FLN NDA, the two approaches were both adopted, namely the enhanced Conventional New Town Approach. It is said that “private land will be resumed for development according to planned uses, while flexibility will be provided for private landowners to apply for lease modification (including in-situ land exchange) to develop their land planned for private development in the two New Development Areas”. [16] A set of criteria with specified deadlines of lease modification application should be met to get approval. This is to ensure that such applications will comply with the planning and timetable for the NDAs development. On this front, the Government will impose more stringent requirements in processing applications for modification of lease subject to specified criteria. The criteria include stipulating that only sites planned for private development are eligible for the lease modification applications. The applications must comply with specific guidelines and conditions to ensure

comprehensive planning, and time limits will be stipulated for completion of such applications to ensure timely provision of housing and other facilities. The land owners must also offer fair treatment to tenants/occupants, including providing a monetary compensation comparable to the Government's arrangement. [16]

This combined approach aims to protect private development right without compromising the planning intention and timely land supply. The ownerships of current development area, which were much more scattered and complex than the land in previous NTs, may be the reason for adopting lease modification approach. If compulsory resumption was carried out, it is not easy for so many land owners to take out their lands to government. It may also save the negotiating time to landowners who initially opposed the land resumption and were afraid to lose their landownerships. In the meanwhile, financial expenditure of land resumption would be reduced for government. However, although this approach protected landowners' rights, it was also opposed by some citizens regarding its potential damage to villagers' rights. Because most of the private land were not owned by local villagers but already bought by different private developers through contracts in the last few decades. Even the villagers still live there, their landownerships were transited to the developers. Since government would not resume the land, it is the private developers' responsibility to compensate the villagers, whose interests may not be guaranteed when negotiating with developers.

The issues in both land resumption and lease modification were discussed, and whether to continue with conventional public oriented resumption or private participation is still suspending. A few applications of lease modification were under consideration in KTN and FLN cases, but haven't got the result yet. [17] This approach will also be adopted in the development of HSK NDA. The fact is that compared with NT development, it is more difficult for the government to acquire large piece of land to develop, due to the scattered land ownerships, more complicated relationships among government, different private land developers, and local villagers, as well as the different public opinions and interests to take into consideration in the planning and development process of NDA.

3.3 *Planning concepts of community vibrancy and nature*

In addition to the built-up land structures and the development approaches, some planning concepts were also modified or paid attention in NDAs. Two main concepts, community vibrancy and nature, were highlighted in this section. Vibrancy is related to facility and service accessibility as well as social integration, while nature is related to ecological protection and the improvement of living environment.

The high density of residence in NTs triggered some social issues. The lack of street life in the pedestrian network both within and in between these neighbourhoods discouraged social activities and interaction. The recent growing demand on the preservation or revitalization of street life has been echoed. In the planning of NDAs, the mixture of residential and commercial uses as well as multi-function open spaces were suggested. For example, in the OZPs of FLN and KTN, commercial uses are allowed in some of the residential sites to serve the local community, therefore shopping street and continuous shop frontages will be provided in residential zones. Pedestrian shopping streets were formed by terraced podium with open space corridors, providing commercial and leisure facilities such as café, restaurants and retail shops on the side. Additionally, integration of new and old

communities, vibrant activity node around the railway station and a balanced population profile with a mix of public and subsidized housing and various types of private housing was also lined out in the plans, to enhance vibrancy and encourage social integration. [13]

Environmental sustainability has been paid more and more attention in recent development plans. The land use zones of “Agricultural” which was rarely mentioned in NT plans, were designated in the OZPs of FLN and KTN NDAs. It aimed to retain and safeguard fallow arable land with good potential for rehabilitation. In HK, the productive function of farmland was not important since most of the food were imported from mainland China, rather, what the “Agricultural” zones want to preserve is peoples’ honesty to nature, integrating with localized lifestyle. Farmland, as a rural land use character, became a symbol in development area. The Agriculture, Fisheries and Conservation Department also introduced a special agricultural land rehabilitation scheme to assist affected genuine farmers to continue farming by pairing up the affected farmers and the land owners who are willing to rent or sell their land in nearby areas. [18] River is another natural element concerned in NDAs, Ng Tung River and the natural ridgelines to the north, the riverside promenade and tree lines along the river bank have been respected in the layout design of FLN and KTN.

Transportation is related to both vibrancy and environment. In addition to compact city form and population concentration near the public transport interchanges, comprehensive pedestrian and cycle traffic networks will be provided to minimize road traffic and improve regional accessibility. Environmental friendly transportation system was proposed in OZPs. In addition to pedestrian and cycle lane, electric bus may be operated to provide feeder services from the area to railway stations. Compared with NT development in the last few decades, in NDA development, peoples’ needs could not be satisfied with residence and infrastructure only, but to live more comfortably with social harmony and better environment.

3.4 Case Study: HSK NDA

To better illustrate the differences between NT and NDA, the cases of TSW and HSK were compared. Hung Shui Kiu located in the west New Territory, next to Tin Shui Wai New Town. It will not only provide housing and other land supply in HK, but also serve as a “Regional Economic and Civic Hub” for North West New Territory. [14] The current planning and engineering study covered 7.14 km² area, initialized from Aug. 2011 until end 2016. The Civil Engineering and Development Department (CEDD) and the Planning Department (PlanD) the consultant AECOM are jointly conducting this study. Both the technical study and community engagement programme were concluded in the planning process.

Technical reports of Geotechnical Assessment, Site Formation Assessment, Traffic and Transport Impact Assessment, Drainage and Sewerage Impact Assessment, Water Supply and Utilities Impact Assessment, Air Ventilation Assessment, Sustainability Assessment, Cultural Heritage and Ecological Baseline Desktop Study were published during 2012-2015. Community engagement programme was arranged in 3 stages. Opinions from government, residents, commissioners, legislative members, NGOs were collected through public forums, meetings, surveys, etc. The study task flow of making Outline Development Plan (ODP) and Layout Plans was extracted from the official website [14] and showed in Figure 4.

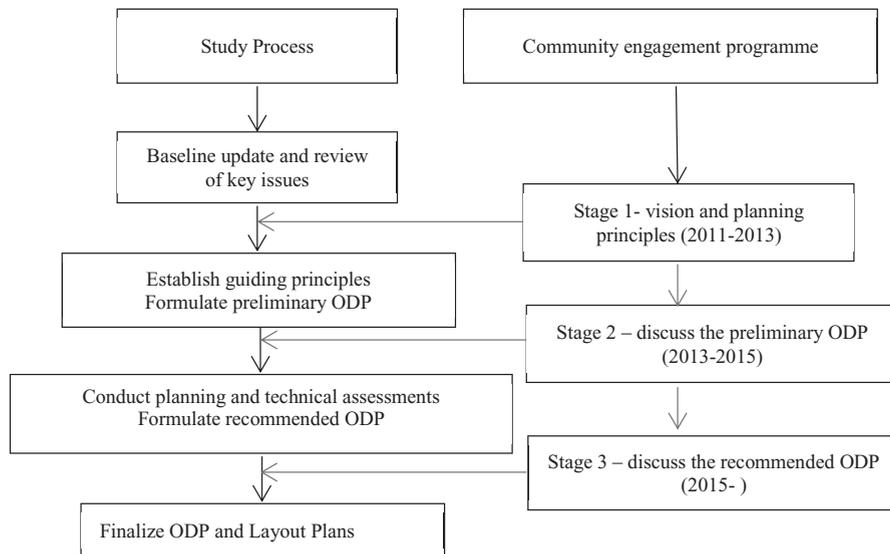


Figure 4. The study task flow of HSK NDA plans

Based on the opinions and advices collected from community engagement, the development plan would be modified. For example, NDA boundary was revised to exclude existing development to the southeast of Castle Pear Road, due to the objection of local villagers. And the main changes in the development area from stage 1 to stage 2 were summarized in six aspects: commercial nodes, industry, social integration, transport, facility and environment. Identified items were showed in Table 3.

Table 3. The main changes in HSK NDA planning from Stage 1 to Stage 2 engagement

Reinforcing commercial nodes	1.	Add a new commercial zone to boost the local economy of Lau Fau Shan
	2.	Restructure the land uses around the existing West Rail TSW Station to create a “District Commercial Node”
	3.	Provide a regional playa near the proposed HSK station
	4.	Increase the commercial mass around the proposed HSK station and introduce government facilities
Restructuring special industry quarter	1.	Designate land for consolidation of port back-up storage and workshop uses
	2.	Expand the scope of uses to allow for producer services and modern and non-polluting industries in the “Enterprise and technology Park”
	3.	Incorporate “Industrial” zone to the west of KSWH for industrial developments
Integrating with existing	1.	Restructure the land uses of the residential cluster to ensure compatibility with the surrounding rural development

developments	2.	Add buffer between villages and proposed new developments
	3.	Reserve suitable sites for local rehousing of affected eligible
	4.	Retain an existing chicken farm
Improving connectivity and accessibility	1.	Provide a direct cycling link to and from TSW and Tuen Mun NTs
	2.	Add retail frontages and shipping streets to promote street vibrancy
	3.	Reserve land for green transportation corridors
	4.	Designate pedestrian street to enhance connectivity
Ameliorating provision of G/IC facilities	1.	Reserve land for green initiatives
	2.	Adjust the Gross Floor Areas of the hospital to serve the local residents and neighbouring communities
	3.	Relocate sports ground and sports centre to the centre of the NDA for easy access
Enhancing ecology and creating sustainable environment	1.	Explore development of community gardens in open spaces and amenity area
	2.	Upgrade sewage treatment level to allow use of treated effluent
	3.	Introduce a retention lake within the Regional Town Park and other sustainable drainage infrastructures
	4.	Introduce open space and green belt corridor to maintain open areas for ardeid flight path
	5.	Provide a continuous amenity strip along Kong Sham Western Highways
	6.	Regenerate the river channels running across the NDA

Source: Community Engagement Digest, Civil Engineering and Development Department and Planning Department, 2015 [19]

According to the planning changes showed in the above table, it evidently implied that the NDA was no longer restricted to the housing-oriented town, but a comprehensive development area, with diversified functions of commercial services, industrial concentration, integrated communities, convenient and environmental friendly transportation, social services, recreation, leisure, etc. Although HSK was regarded as an extension of TSW NT, its development objectives and potential attraction seemed much stronger than TSW. Table 4 compared the main planning information in TSW and HSK. The information were collected from their development plans [13, 14].

Table 4. The comparison of TSW NT and HSK NDA

Item	TSW New Town	HSK New Development Area (in plan)
Area	430	442
Population	306000 (in plan) 287901 (in 2011)	215,000
Population density	712 (in plan) 670 (in 2011)	486
Ownership before development		
Employment position	133,833 (2011) *	150,000
Employment/Population	46.5%	69.8%
Public/Private house units	7/3	5/5
Industrial land	N	Y
Shopping street in residential zones	N	Y
Development approach	land resumption	land resumption and lease modification
Community gardens	N	Y
Special agricultural rehabilitation scheme	N	Y
Preserved villages	N	Y

*Note: the Employment of TSW was sourced from 2011 Population Census, Census and Statistics Department [11]

Different land use structure and function, development approaches, and planning concepts between NT and NDA were demonstrated in this table. Since NDA was an extension of its closest NT, their difference, especially the land use functions would be interacted with each other, while the regional attractiveness and development vitality were improved with their integration.

4. Discussion

Since 9 NTs were already constructed or under expansion, the New Town programme in the last decades considerably contributed to the economic and social development of HK. The flowing question is, will we have the tenth NT? The most important issue to concern is whether the government could find out a large piece of land for developing. However, regarding the high density in Hong Kong Island and Kowloon, as well as the complex land ownership in suburban and rural New Territories, it is hard to develop a new town in traditional way. As the city expanding, the development strategies would also be changed to adapt current situation, including the complicated ownership, peoples' increasing needs and environmental issues. Development in suburban area is still an important approach to provide land for urban use, however, more challenges would be confronted by governments and urban planners.

Whether private developers could/could not develop their land directly without land resumption is an important criteria to identify new/conventional development. Regarding the scattered land ownership and difficulties in acquire the large piece of land to develop, the lease modification approach intended to encourage landowners to provide the land as planned intentions, assuring their ownership would not be lost. However, in some peoples' opinion, this approach is more likely to protect developers' development right and increase their interests, rather than protect local villagers' rights. As for the government, it is essential to trade off among the profits of developers, the interests of local villager, and the provision of land for future residents. No matter what development approaches were implemented, the baseline is the Outline Zoning Plan, which means all development should be consistent with the planning uses. Therefore, more involvements were required in the planning phase, and the in advanced understanding of the interests of developers, local villagers and future residents were essential. If the OZP is persuasive enough to provide the optimal land use distribution regarding opinions from all affected stakeholders, it would become the balanced decision based on the trade-off of different peoples' interests to guarantee the development, whatever the development approach is.

The changing planning concepts and elements were also distinct. If housing, infrastructure and facility were the main elements in NTs, employment, vibrancy and environment were suggested to be the new compulsory elements in NDAs integrating to the traditional planning concepts. Rather than providing houses for people to live, the better living quality and environment should be considered in new development. Economic and civic hub, commercial node, retail clusters, street vibrancy, logistics, enterprise quarter, riverside promenade, regional town park, plaza, amenity strips, community gardens, heritage trails, visual corridors, and even Fung Shui lanes will be parts of suburban planning to satisfy peoples' needs in new development projects.

5. Conclusion

New town development is the dominant land supply approach in the urban fringe of Hong Kong in 20th century, which contributed considerably to economic development and the housing, infrastructure and facilities provision for the increased population. However, it was more and more difficult to acquire large pieces of land for new towns, and NDA was designated as the new approach to continually supply built-up land in urban fringe area. The land use transition from NT to NDA were embodied in three aspects, including land use structure and function, development approach, and planning concepts. Rather than the main function of residential land supply in NT, commercial, industrial and mixed uses were also considered to achieve various urban functions in the area. Regarding the scattered and complicated land ownership, private landowners were able to directly develop their land through lease modification in NDA, as an alternative development approach of land resumption in NT. In addition, vibrancy and nature became two essential planning concepts in NDA for more sustainable development. Since NDA was an extension of its closest NT, NDA could make up the functions that were absent in NT, and their interaction would improve regional attractiveness and vitality in urban fringe area. Confronting the challenges in NDA, the planning process and public engagement are more important than NT. The proposed layout plan should be persuasive enough to provide the optimal land use distribution based on opinions from all affected stakeholders, as a balanced decision and trade-off of different peoples' interests. In addition to the case of HK, the understanding of land use transition in urban fringe area and strategies for development challenges would also be helpful to others growing cities.

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