

## Typological research on the spatial forms of small towns in the Pearl River Delta, China

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### Abstract

*After the reform and opening, it has experienced a rapid growth of rural industrialisation, towns have undergone dramatic reconstructions in the Pearl River Delta region. The forms present the characteristics of peri-urbanization, which is usually defined as 'small towns' in Chinese academic. Nowadays, the research on its forms roughly summarises them as mixed urban and rural areas. In fact, the spatial forms of small towns in the Pearl River Delta have various differences, forming a great variance from "big industrial towns" to "small rural towns". This paper aims to analyse the spatial diversity of small towns in the Pearl River Delta by typo-morphology. First, this paper analyses the characteristics of four types of plane units in small towns in the Pearl River Delta. Second, taking the complexity of plan units as the clue, the paper summarises four types of morphological regions in small towns, Pearl River Delta region: Old Town, Old Village, Industrial Accretion, and Living Accretion. Finally, the paper divides small towns in PRD into 3 types and 9 subtypes through the analysis of spatial expansion.*

**Keyword:** *small town, plan unit, spatial expansion*

### Introduction

As a pioneer of China's reform and opening, the Pearl River Delta (PRD) region has experienced rapid rural industrialisation. Small towns have realised the transition from planned economy to market economy (Shen, J. and Chen, L., 2005), which has brought about the rapid expansion of town space. Small towns have transformed from the original service and trade centre to the diversified life and production centre. And the town space has undergone a drastic reconstruction from traditional town to *desakota* (McGee, T.G., 1989). The characteristics of small-town forms include mixed land use layout, rapid expansion of scale, patched and fragmented townscape. And there are a series of problems such as mixed production and living space, poor eco-environment, and lack of service (Yang, S.Y. and Tian, Y.S., 2020). While the small towns found at the edge of the PRD still hold the morphological characteristics of traditional towns. The similarity and diversity of small towns in PRD are difficult to be summarised by "semi-urbanisation". This study takes 309 small towns in PRD as samples and parses spatial forms of small towns under the typo-morphological perspective. Then it combines space expansion of small towns to sum up the morphological characteristics of small towns. The research provides a certain basis to promote research of small towns in PRD.

### Background

Before 1949, the Pearl River Delta region was the agricultural base of Guangdong. As the commercial centres in local areas, small towns mainly serve the surrounding villages. Formation of official or folk markets attracted people to live in clusters around them. The bazaar and houses formed the embryonic form of small towns. With continuous growth of administrative and service roles of small towns, multiple buildings such as administrative organs and schools have emerged, and the size of small towns has begun to appear. Small towns have become "communities composed of people who don't work on agricultural labour"(Fei, X.T., 1985). After the reform and opening, agglomerating labour-intensive industries in villages and towns direct drives the transformation from primary industry to secondary industry in small towns of PRD. In 1980s, administrative reform of Guangdong carried on, and the government delegated administrative power to the city and county levels (Luo, Z.D., 2007). Township governments got more autonomy in economic development and the right to decide local reform policies. The governments have provided a cheap material base for the rapid growth of township enterprises by a series of measures such as setting preferential policies, non-agricultural development of land, and construction of industrial parks at village and town levels. The rapid increase in the number and scale of township enterprises has attracted a mass of migrant labour force to work, and the demand for living and living has soared. Industrial plants, industrial parks, and supporting service buildings have become the leading role of small-town development. Besides, various specialised buildings such as administrative institutions, schools and shops appeared, which either changed from residential buildings or formed unique architectural forms to adapt to their roles. In market economy, introducing enterprises of three import and compensation trade has driven development of township enterprises. The sharp increase in the number of township enterprises has attracted vast migrant labours. In order to meet living needs, construction of houses and service buildings has also increased and the types of buildings have been constantly enriched. The built-area expansion of small towns is influenced by population and economic growth, urban planning, and government intervention (Han, S.S., 2010). The small but complete, scattered and disorderly industrial layout leads to the space of small towns in a state of large quantity, wide area, and disorderly expansion for a long time (Ye, Y.Y. *et al.*, 2011).

Most of studies on small-town space in PRD focused on the core areas with higher economic levels and obvious industrial characteristics, such as Dongguan, Foshan, Zhongshan, and other cities. In these areas, the rural industrialisation from bottom to top and the administrative decentralisation reform from top to bottom make development of small towns not centred on the town. And the construction land spreads within the town or develops across the boundary of the town, resulting in the space phenomenon that "village is like town and town is like village". Therefore, the spatial status of small towns in PRD is summarised as "semi-urbanisation" or "desakota" by urban planners and geographers. However, in different regions of PRD, economic development is different because of differences in industrial causes such as industrial types and sources of funds. Small-town forms also have different characteristics. For example, the form characteristics of towns led by manufacturing industry is high fragmentation, uniform distribution (Li, J.H. *et al.*, 2019). After

the financial crisis, small towns are facing foreign investment withdrawal, factory closures, population shrinkage, and industrial land idle (Li X. et al., 2019). The spatial problems about "high quantity and low quality" are prominent. Zhaoqing, Jiangmen, and Huizhou lag in industrial development due to geographical environment, traffic, and other causes. Most of small towns still hold the characteristics of traditional towns gathering along line or around centre. Town construction mainly contains houses, whose development intensity is low and space expansion is slow (Zhao Y.T., 2018).

## Methodology

Town forms have a sequence from part to whole. Karl Kropf combined Caniggian and Conzenian subdivision methods of morphological elements, and built a hierarchy of typo-morphology (see Figure 1). At the same time, he proposed the "resolution" concept. When interpreting town forms, different resolutions mean different scales of plan elements for typo-morphological analysis (Kropf, K., 1993). After introducing typo-morphological framework into China, Chen Fei proposed a Chinese typo-morphological framework consisting of seven elements, which are general plan, skyline, street network, block and land plot, public space, public building, and residence in combination (Chen, F. and Thwaites, K., 2013). And Chen has carried out the applications in Nanjing, Suzhou, and Guangzhou. Existing theoretical research results and practices provide a good theoretical basis and methodological support for this study.

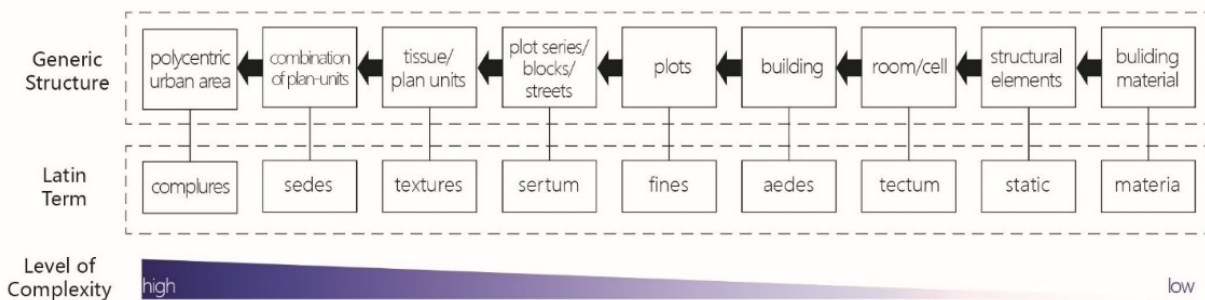


Figure 1. Kropf's 9 genetic types.



Figure 2. The locations and regions of 309 small towns in PRD. (Red dots: town location; dark grey blocks with white boundaries: the region of town; white blocks: sub-districts or other specialised districts).

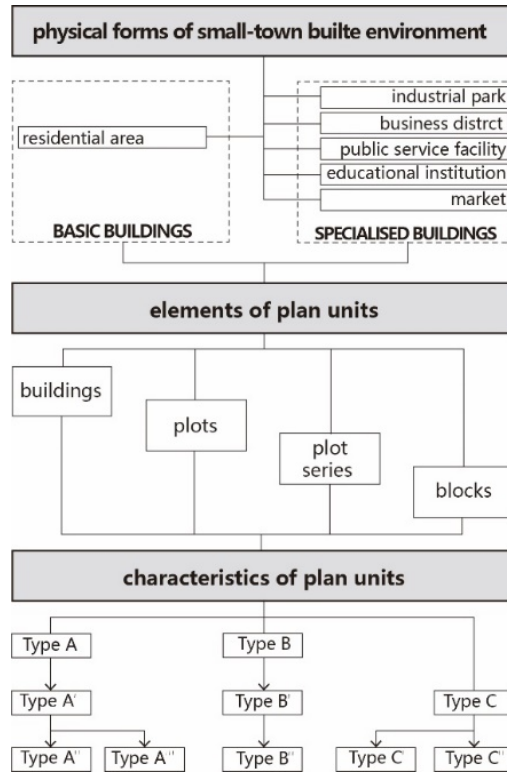


Figure 3. The research framework for plan units of small towns.

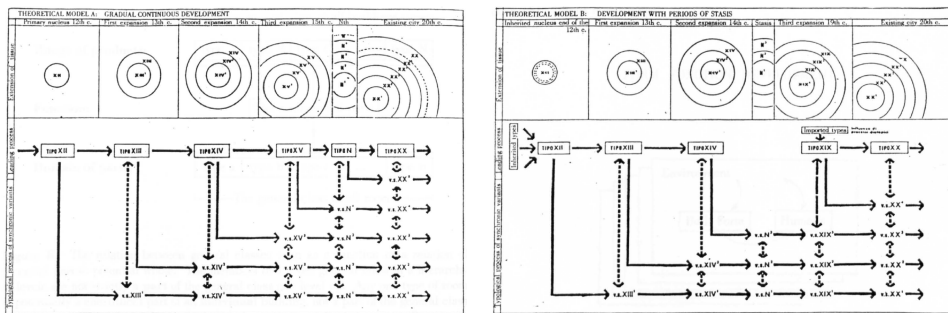


Figure 4. The typological process and the growth of towns from Caniggia (Kropf, K., 1993).

The research scope of this paper is the Pearl River Delta region, which is located in the middle of Guangdong Province, including 9 cities: Guangzhou, Shenzhen, Zhuhai, Zhongshan, Dongguan, Foshan, Jiangmen, Zhaoqing and Huizhou. There are 309 small towns in 8 cities except for Shenzhen (see Figure 2). In 2019, the registered population of small towns in the Pearl River Delta region is about 17 million. This paper takes small towns as the research objects. And the research hierarchy of this study is determined as "town -- composition of plan units-- plan unit -- building" by referring to Caniggia, Kropf, and Chen. This paper doesn't discuss detailed features of buildings as the grain of plan units. It just identifies the basic buildings and specialised buildings in small towns. Then this research divides the types of plan units according to hierarchy analysis of buildings, plots, plot series, and blocks, and try to explain the typological process of plan units (see Figure 3). Based on the town expansion model by Caniggia (see Figure 4), this paper classifies the types of small towns in PRD with composition of plan units and town expansion process, and analyses their typo-morphological characteristics.

## Results and Discussions

### Basic buildings and specialised buildings

Housing is an important part of small-town forms, and its architectural changes are remarkable. In the early stage of small-town formation, the houses followed the traditional Guangfu architectural form, mainly including houses with three rooms and two corridors, *Zhutongwu* houses, and *Mingziwu* houses. In small towns with large population and little land, traditional houses gradually evolved into storied *Zhutongwu* and storied *Mingziwu*. After 1949, under the influence of planned economy, the public ownership of housing appeared, most of which were multi-storey houses, breaking through the traditional housing forms. After the reform and opening, industrialisation brought about a dramatic increase in population and demand for housing, housing forms changed again. Apartments, garden houses, residential estates, and villas have become the mainstream of residential construction.

Besides, market, factory, school, administrative institutions and other specialised buildings carry town roles such as service and production. The building types are constantly enriched with development of small towns and increase of residents' production and living demands.

### Types and evolution of plan units

Based on investigation and analysis of small-town forms, this study finds that there are mainly 4 types of plan units that make up the spatial forms of small towns (see Figure 5). Due to the influence of time course, space displacement, and demand change, all kinds of plan units have gone through their evolution course.

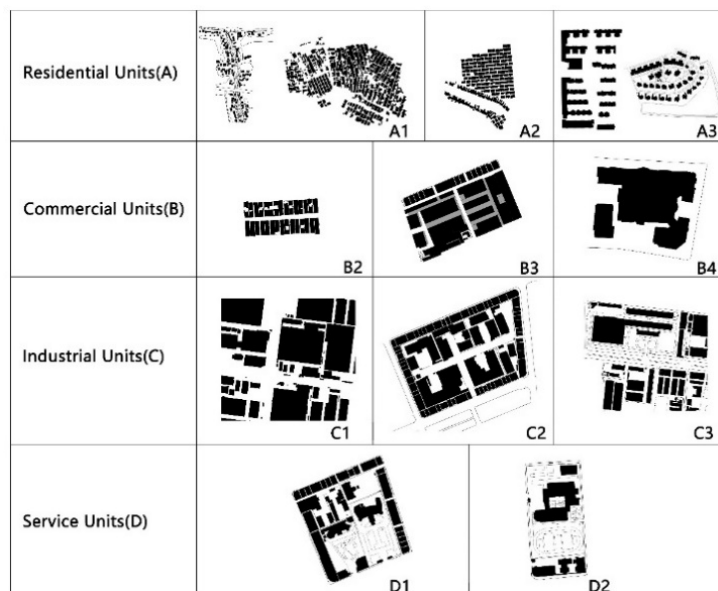


Figure 5. Four types of plan units in small towns, PRD.

**1) Residential units (A):** The residents built the original residential units (A1) by themselves in the early stage of small-town construction. The space pattern was mainly influenced by the natural environment, resistance to invasion, and clan beliefs. The most common forms are bands and clumps. The internal layout of them is

compact. The plots are of different sizes and generally small, and the streets are of different curves and generally narrow widths. The residential units (A2) were built under guidance of the unified planning of the government after 1949. Most streets in A2 are horizontal and vertical, and the residential plots are of equal size. After the reform and opening up, the real estate boom swept from Hong Kong. The residential units (A3) developed as a whole by developers appear. The units are complete plots, with high-rise buildings or single-family villas as the main buildings.

**2) Commercial units (B):** The marketplace (B1) emerged earlier than small-town forming. The primitive bazaar is not permanent. It was an open space for merchants to hold a fair regularly. After merchants and residents gather, a business street (B2) or indoor market (B3) appears and becomes the trade centre or specialised market of the small town. After the reform and opening up, the modern shopping centre (B4) entered the small towns and became the emerging consumption and leisure centre.

**3) Industrial units (C):** After 1978, the three enterprises and one supplementary enterprise gathered in the villages and towns of the Pearl River Delta, and the industrial land increased greatly. The initial industrial area grew rapidly at the edge of the residential area, forming a series of industrial plants. Small towns with weak planning awareness, industrial construction presents a state of scattered land layout and messy factory buildings (C1). While towns with strong planning consciousness take the path of developing "road economy". The governments carried out non-agricultural rearrangement of land by opening roads and improving facilities first. The industrial land (C2) is surrounded by commercial or residential buildings on the streets, forming an industrial zone along the road. With industrial development and transformation in PRD, intensive industrial park (C3) has become the first choice for industrial construction. Under guidance of planning, town government could set up a large-scale industrial park by renting complete plots or building a town-level industrial park.

**4) Service units (D):** The service facilities in small towns mainly include administrative institutions (D1) and educational institutions (D2). Most service units are located inside or on the edge of residential units. The acreage of a single service plot is much larger than a residential plot.

### **Combination of plan units**

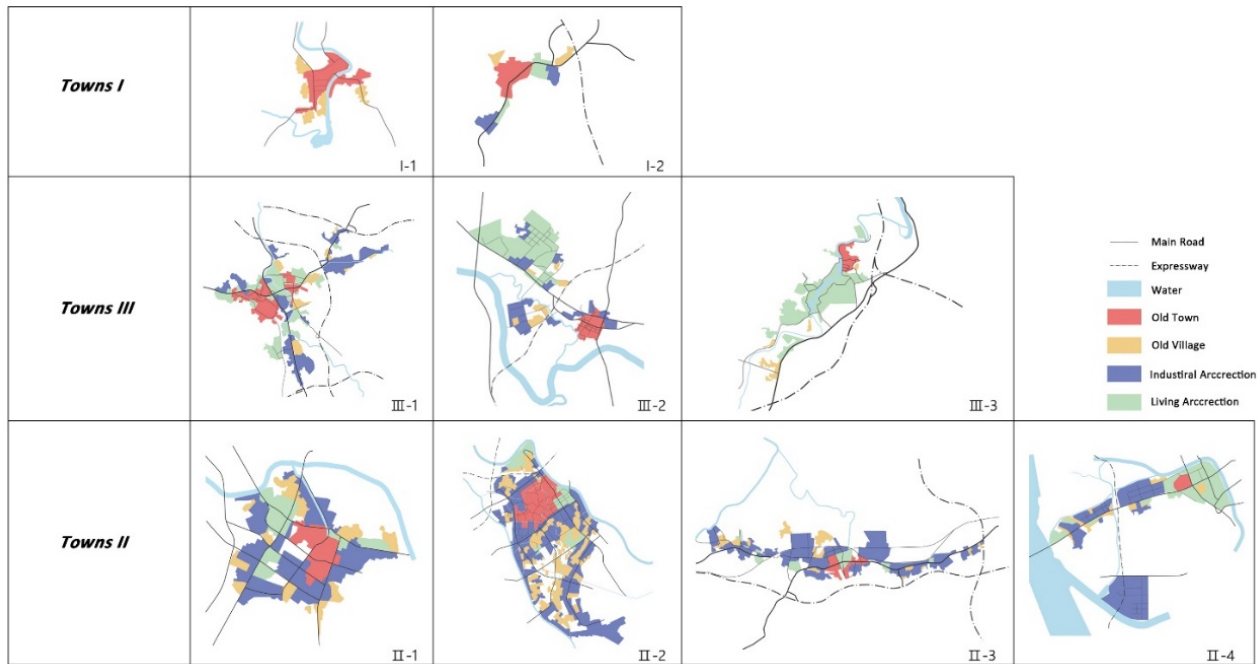
Combining types of plan units with the spatiotemporal evolution of small towns, this study finds that small towns in PRD are mainly composed of one or more of four types of regions. The region is a complex based on composition of plan units, named Old Town, Old Village, Industrial Accretion, and Living Accretion. Old Town consists of residential units (A1 or A2) and few commercial units (B1, B2 or B3) or service units (D). They were built before 1978 or even earlier. Old Village is also a natural village living area mainly comprised of residential units (A1). At beginning of town formation, Old Village does not belong to small towns but keep in touch with them. It becomes a part of town space in process of continuous town expansion. Industrial Accretion is the product of rapid industrialisation, which consists of large acreage of industrial units (C) and



few residential units (A2). Industrial Accretions are usually located on the outer edge of Old Town or Old Village. Living Accretion can also be named New Town, which is a container for overflow of living demand. It formed mainly by residential units (A2, A3), commercial units (C3) and service units (D).

### The types and expansion of small towns

Based on composition of plan units and characteristics of town forms, the small towns in PRD can be divided into three types (see Figure 6).



**Figure 6.** Three types of small towns, PRD.

**1) Towns I:** Towns I keep the scale of Old Town for a long time or extend with a few living and industrial accretions. Restricted by traffic and other environmental causes, the industrial development of Towns I is slow, whose dominant industry is still agriculture. The population growth of them is slow or even negative.

**2) Towns II:** Expansion of Towns II is mainly reflected in the growth of Industrial Accretion. Relying on industrial development, Towns II form various town space under the overall planning of different subjects. As towns under the managements of town government, Industrial Accretion is mainly around Old Town (II-1). Also, town government selects suitable location to build town-scale industrial park as enclave (II-4). Under the joint planning of town and village, Industrial Accretion and Living Accretion expand around the town, forming a patchy and mixed status of interweaving with old villages and farmland (II-2). For small towns mainly with village-level industrial parks (II-3), it can be seen that land expansion of village-level industrial parks near villages is obvious, while expansion of towns is not.

**3) Towns III:** The growth of Town III is dominated by Living Accretion with little industrial construction. The Living Accretion is mainly composed of residential units (A3). They take advantage of transportation or natural resources to develop housing estate or tourism. Towns III take over the overflow of residential and leisure demand of people in metropolitan regions.

## Conclusions

The morphological analysis of town space is a significant step towards a comprehensive understanding of small towns in PRD. Based on the analysis of the plan units and expansion of small towns, this paper divides small towns into 3 types and 9 subtypes. It broadens the horizon of small-town forms in PRD. The study also reveals how local and industrial causes influence on forms of small towns. We could carry out a deeper study on small towns based on this research in the future, to provide a scientific basis for development of small towns.

## Acknowledgements

This research is supported by the National Social Science Fund of China (NSSF) grant No.18ZDA161. Yinsheng Tian is the corresponding author of this paper.

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