Evolution of The Metropolitan Area of Shenzhen, Analysis: From Theory to Selected Examples

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Abstract. A continuously expanding megacity, the city of Shenzhen is situated on the eastern bank of the Pearl River delta, in the Southeast of China. After only 37 years of urban development, it is currently the fastest growing metropolitan area in the world. It is also a huge-scale experiment, in what is commonly referred to as a “plan-led urban form”. Established in 1980, as a first Special Economic Zone (SEZ), and through the transformations of successive master plans, Shenzhen has now become one of the largest urban areas in China. Specifically, “The Master Plan of Shenzhen 1996-2010” and its subsequent revision, “The Comprehensive Plan of Shenzhen 2010-2020” reconfigured and accelerated city growth. Since 2010 the metropolitan area expanded northwards, including the previous non-SEZ territories. The plan was focused to conclusive structural evolution on border and periphery zones. The current structural master plan introduced a hierarchy of urban development on a municipal level, district level, and cluster level. Another important aspect was to regulate and control land use policy to avoid speculations on land price and building density inside emerging new districts and clusters. This article will try to describe, via particular examples, how concepts result in real site situations. It will analyse the process of detailing, from spatial development of multi-scale theoretical plans into architectural plans of study cases and finally built projects. Architectural features such as a specific building function or scale always reflect on pre-proposed theoretical guidelines of urban planning. Spatial hierarchy is imposed from macro-scale into micro-scale. Chosen insights are corresponding with recent periods of urban development and respond to infrastructural, economic and social needs of the time. The buildings are designed by European consultants, gmp International GmbH architects and engineers and they are implemented to Chinese frameworks. The analysis is based on comparison of theoretical surveys and observed in-field implementation. As a conclusion, the author tries critically to analyse the advantages and disadvantages of the fast and global growth of Shenzhen metropolitan area and transposition into architectural scale. What is making Shenzhen unique and innovative in city development?

1. Introduction
According to The State Council of the People's Republic of China from early 2018, Shenzhen has been officially declared as a national innovation demonstration zone for suitable development. Since its beginning, the city was subject to planned changes, verified in the 5-year improvement periods. The last masterplan (2016-2020) contains the 13th of a 5-year plan review; with a specific focus on wider regional development: economic corridors, connection belts, transportation hubs, etc. In the future two systems, Guangdong Region and Hong Kong-Macao Region should be combined into the Guangdong-Hong Kong-Macao Bay Area [1].
In detail, the agenda also comprises the issue of revitalization of the so-called “urban villages” (Note 1). The planning bureau of Shenzhen finally launched an urban regeneration proposal in June 2017, indicating a new era with the revitalization of Baishizhou – the largest “urban village” inside the city center [2]. As late as 1970, Shenzhen was still a small fishing village with 30,000 inhabitants [3]. In 2017 the city reached 1.09 million inhabitants [3], probably a highly underestimated number has given the large amount of illegal migrants, known as a “floating population” [4].

For many years, the development inside the “Special Economic Zone” (SEZ) was associated with global manufacture for low-tech products and the idea of cheap “imitation copies”. Meanwhile, the world’s transformation takes place in the Pearl Delta Region where a completely new “global innovation network” is being built. In recent years, the so-called “Fund Towns”-phenomenon can also be observed in China. Qinghai-Shenzhen-Hong Kong Fund Town (QS-HK) belongs to such planned centers that are designed to attract investors and companies with innovative ideas in the future [5]. Shenzhen has reached the level of Japan, is catching up with the U.S. and has long exceeded the level of Europe in terms of number of applications for patents. At the national level, metropolitan area Shenzhen is ranked first [6]. Openness to innovative proposals as well as the possibility of a desirable life style, attract the younger generation. Although Shenzhen does not have highly-renowned universities, expenditure on research development is very high. For example, the Huawei Company spends more money on research programs than Apple [6].

The first part of this paper will show a theoretical background of the city development. The second part will try to analyze a real result of the planning process. The third part will outline the positive and negative aspects of rapid development and its impact on the real appearance of the city – based on the Shenzhen model. Finally, the author will explain what is making Shenzhen City exceptional and innovative.

2. Evolution of Metropolitan Area of Shenzhen

The first masterplan of Shenzhen, titled “1982 SEZ Master Plan”, was based on: multicenter – cluster – belt urban structure, composed of Nantou Cluster, Luohu-Shangbu Cluster and Shatoujiao Cluster. Three clusters were connected by a major trunk road – Shennan Road [7]. Shenzhen metropolitan area was covering the “Special Economic Zone” (SEZ) and was separated by a “second line” from non-SEZ zone. Bao’an and Longgang were independent Counties located outside of the SEZ. Through this phase, the fastest development as well as the largest investments took place in central Luohu-Shangbu. This part of the city was the closest area to the crossing border point with the special zone of Hong Kong. The urbanization of Louhu, at 80 ha, proceeded too fast and too intensely, therefore the SEZ authority decided to reduce the development scale by cutting down the number of high-rises from 80-90 to 40-50 and also reduced the plot ratio to a maximum of 5, in comparison, the rural area plot ratio was 1 [7]. Nautou was developing independently, prospectively promising an important strategic position for the future corridor towards the north-west, as well as due to direct access to the bay. Shatoujiao Cluster, on the east end, became one of the first processing trade areas and developed processing, breeding and trading industries. Shatoujiao port was opened in 1984. During this period, internal corruption of land pricing and unchecked urbanization acceleration became a notable problem. As a consequence of this, the “Strategic Planning in Shenzhen, 1989”, was gradually enlarged to areas outside of the SEZ. In the 1990s, the Luohu Hill was levelled, to provide additional land for urban expansion [7]. In this period, industrial zones, residential zones as well as green zones were defined. Twenty-two city parks, five public gardens and 140 km of green belt were created [8]. These were the first steps towards environmental sustainability. Shenzhen had gained the name of a modern green city.

Significant changes in city planning were brought by the masterplan, dated 1996-2010. From this moment, the area of Shenzhen was interpreted in the broader spatial and geopolitical context. The spatial layout of the city was interpreted as two systems: the urban development space, which formed a “W”-shape, and the natural conservation space, which formed a “M”-shape [7]. The plan used a clustered linear model and was divided into three zones: west, central and east. In each zone, components were located hierarchically: three city center clusters, urban clusters and autonomous towns. There was still
a distinction between the SEZ and non-SEZ areas. Respectively, the clusters had so-called development axes in the northern orientation (see Figure 1). Another important factor of this plan was to retrieve the land transfer rights and avoid the illegal casual transferring practices [7].

![Figure 1. The Master Plan of Shenzhen (1996-2010) – English explication by author, [9]](image)

Verified in 2007, the comprehensive plan of Shenzhen complemented the previous plan by introducing a second horizontal belt and extending the vertical corridors towards the Hong Kong Region, as well as the elimination of the division into three cluster areas. From this plan emerged two city cores: Futian-Luhou Center and the new Qianhai Center (see Figure 2).

In 2010, the original SEZ boundary line was omitted. The Metropolitan area of Shenzhen has expanded and henceforth includes the independent Counties. The city network as an urban model was proposed for the first time. Internally the city networks are hierarchically distinguished: City Core Center, District Centers and smaller Cluster Centers (see Figure 2). Although the entire territory of Shenzhen receives the status of metropolitan area and should be subject to uniform law and development; “urban villages”, due to their unregulated status, are not drawn into the plan at that time, which causes inconsistent development inside the smaller city quarter [4].

To protect the city environment, the Shenzhen authority also developed a plan to set up a construction boundary called the “Ecological Control Line” and the state government also controls the urban expansion of Shenzhen by putting a limit on the quantity of developable land [7]. The built-up area has expanded from 3,8km² (1980) to 395km² (2006) [8] and has reached approximately 104,119 hectares (2013) [10].
3. From theory into selected examples in practice

In terms of urban growth, the development of Shenzhen can be divided into three steps: the first in the early 1980s inside the Luohu District, the second, the comprehensive spatial development of SEZ and the third, a grounded structural development on a regional level [8]. The following examples will be examined on how the buildings incorporate into a theoretical city model.

3.1. SZCEC, municipal level, 1st city center

The Shenzhen Convention and Exhibition Center (SZCEC) was built in a second phase of the urban development of the city, in an extremely fast construction time, between 2002 and 2005, and after the winning of an international competition in 2001. During that early period, the city demanded main infrastructural equipment on municipal level, based on government contracts. The building is located between Shennan Avenue and Binhe Avenue on the west-east city core axis. Together with the Municipal Library and green space, it is thus creating a spatial composition oriented in the north-south direction (see Figure 3). The total exhibition area is located on one level, with a rectangular plan of approximately 280 m by 540 m and a total gross area of 256,000 m². The SZCEC with its length of more than 540 m is evocative of the famous Crystal Palace of the London World Exhibition in 1852 and surpasses the large glass hall of the Leipzig Exhibition Centre built in 1996 with double the length [12]. The elevated entrance and visitor platform is located 7.50 m above exhibition and street level and allows separate access to single halls or combined hall complexes (see Figure 4). Chinese cities are well known for city hanging bridges, which help to separate pedestrian flow from large traffic systems. The long, horizontal structure forms a contrast to the predominantly vertical aesthetic of the numerous high-rise towers, which frame the exhibition center on both sides [12]. South of Binhe Avenue, the “Huangguang Urban Village” becomes visible. This is an older area with a strong contrast to the oversized scale of SZCEC (see Figure 5). “Urban villages” can cause many problems within a Chinese city structure. These
types of land designations have recently been included into current urban planning trends and require a comprehensive revitalization and restructuring arrangement.

Figure 3. SZCEC area view [12]  
Figure 4. SZCEC site plan

Figure 5. View of SZCEC from the “urban village”, photo copyright: Jan Stiefke

3.2. Bao’an Stadium, district level
As a result of an international competition, which took place in 2007, this project was executed between 2009-2011, for one of the largest sports events in the world, the Universiade 2011; designed as an athletics stadium holding 40,000 spectators with the gross floor area of 88,500 m². Bao’an district was previously integrated into the metropolitan area of Shenzhen. The stadium is being built in the immediate vicinity of a sports arena and a swimming pool, which have already been established on the west-east axis. The stadium and the attached training facilities fall within this existing urban axis (see Figure 6). The choice of a pure circle for the geometry of the stadium was based on a decision not to introduce any other geographical orientation into the urban planning situation, and to emphasize the central character of the sports venue (see Figure 7). Appropriately, for the uses of the building, the stadium stands on a grassed plinth, which on the inside incorporates the lower tiers of seating and internal functional areas. The extensive bamboo forests of southern China were the inspiration for the design. The bamboo look serves two purposes. It reflects the character of the region, and thus creates identity (see Figure 8). And it serves as a structural concept for both the load-bearing frame of the stadium stands and the supports for the wide-span roof structure. The outermost part of the stadium unites facade, structure and overarching architectural theme in a single feature [11].
3.3. **Huawei Development & Research Office Buildings, cluster level**

This is one of several projects designed by gmp *International GmbH architects and engineers* for Huawei Company in various locations throughout China. The complex was formed in the period 2011-2015, when the urban zone spread to the outskirts of SEZ into Longgang District. Contract was established directly by private company as a client. Free-standing low pavilions among greenery underline the care for ecology; show also a suburban character of the area (see Figure 9). Function of the Research Office Buildings responds to the late stage of innovative city development. Large urban blocks and roads were planned during very short time in outer SEZ territories. As a result, Chinese cities look increasingly the same, as local administrations adopt almost identical development agendas [4].
3.4. Qianhai Trade Center, municipal level, 2nd city center

The Qianhai Bay Area (CBA) is one of the latest huge construction venues inside the city. In the near future the CBA should inherit the function of transportation hub, financial Central Business District (CBD) and multifunctional zone with think-tank units on a regional level. Following the last theoretical Comprehensive Plan of Shenzhen 2007-2020, Qianhai Trade Center is located on the waterfront in the south-west end of the city and will be a second independent city core on a municipal level (see Figure 12).

The large, mostly empty, or temporarily used land, has already been divided into urban plots with multidisciplinary infrastructure system of: roads, water, drainage, canalization, gas, central heating, telecommunications, etc. QTC building is one of eight towers, forming part of a high-intensity development zone of Neighborhood 03, Unit 19 (see Figure 13 and 15). Volumes are linked by a pedestrian bridge on level 2 and have direct access to public transportation. Expected construction time is 2015-2019. In this recent project, the complexity and the gradation of public spaces are much more visible than in those projects previously described. Noticeable is also the care for a combined and integrated approach of architectural, landscape and lighting design. Nonetheless, the plot ratio is too high, and the buildings are placed too closely to one another. It is desirable that the entire area will evolve with a similar quality and sustainability (see Figure 14).
4. Positive and negative facets of fast growth and their impact on the real appearance of the city

Positive aspects:
- improvement of network on regional level
- continuous city economic growth and growth of resident’s wealth
- multi-centre development of different zones within metropolitan area
- consistency of plan-lead implementation, intentional multidisciplinary preparation of infrastructure
- mobility – rapid improvement of traffic infrastructure in the entire region
- green city, fixed ratio: city parks, residential gardens
- sustainability of greenery – along banks of coastal area

Negative aspects:
- lack of legal control – over-exploration of land resources and water resources
- lack of legal policy – transformation of agricultural land into regressive housing enclaves
- increase of migration – side effect: illegal inhabitants, poor zones in “urban villages”
- priority of economic and physical interventions, neglected social aspect
- instability of urban planning decisions – overloaded plot density and building heights
- large-scale construction site – increase of pollution
- accelerated and sometimes not adequately coordinated planning process or approach – low result of execution work

5. Innovation of Shenzhen City development

First of all, the Shenzhen geopolitical situation makes the city exceptional. With a strategic position in-between the international boundary and national boundaries of mainland China, Shenzhen profited from special regulations during the whole development process. Close access to Hong Kong gave the region the opportunity to be easily discovered and to grow rapidly. Seeing that from other perspective, the neighbourhood of established Hong Kong as a global player is difficult to cope with.

Innovative is also how Shenzhen as a city developed. In common case studies, mega cities grow around an existing city center. In Shenzhen, the city was alone in its inception as a special economic zone [4].

Innovation of the city can be also understood as a novelty of land management, and as a direct result of market liberalization in Post-Communistic China [7].
6. Conclusion
The Chinese concept of size and quantity cannot easily be translated into the conditions of European thinking. There is an eternal question about the accurate ratio of the built-up space to the human scale. From the point of view of our habits in European society, this relation in Chinese cities can be seen as misbalances. However, taking into account the size of the population of China as well as the pace of technological development, such fast but systematic and theoretically planned development is necessary. There is no doubt that the Shenzhen case is unique and innovative, even if there are negative traits inside the positive development. It can even be said that the mere fact of the existence of an experiment already implies the innovation of the phenomenon.

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