

## Evolution of the Block Morphology: Comparative Case Study of the Block Scale Between Chinese Megablock and Other Area

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### Abstract

*There is no denying the significance of understanding “scale” in urban studies in China. In either daily life or theoretical analysis, the ‘mega’ scale has become part and parcel of the Chinese context, intuitively observed by researchers, citizens or even outsiders as a key and foundational role in all dimensions and formats of urban issues. However, scale, at the same time, is often overly underestimated in many studies of Chinese urbanization. When examining the form of Chinese urbanism and its spatial organization, one should understand both the meaning and roles of scale and its mechanization in any type of urban development. This brings in its wake of other questions that pertain to whether the elements of scale can be fully conceptualized and theorized to act as the basic conceptual framework and analytical tools for analysing the Chinese urban form as well as future trajectories of Chinese urbanisms and their evolution processes.*

*The research focus is on the analysis of block scale and more specifically, a mega-scale block typology, which has been widely discussed within the literature of Chinese urban morphology. However, there is little clarity on how big is the Chinese urban block when compared to urban blocks of other forms of urbanism? Within this framing, we also begin to question how big is the “megablock”?*

*This study compares the Chinese megablock with other representative type of urbanism. As part of the comparison, a quantitative analysis of 100 cases from across the world are assessed through a morphological and statistical lens: to classify and rank their value, proportion, and distribution, in order to objectively discuss the evolution of block scale. In addition, to quantitatively describe the unique characteristics of Chinese megablock that worth to be further investigated.*

**Keyword:** *scale, block morphology, comparative study*

### Introduction

Compared to European cities of the same period, Chinese city blocks have always been much larger, in both ancient times (Guo, 2019) and after the 1949 establishment of the People’s Republic of China (PRC). Existing models of development easily exceed more than 20 hectares, which is regarded as a tribute to the ancient Lifang (里坊, neighbourhood) system (Sun & Liang, 2003). The adaptation of the Soviet Union’s models of ‘microdistrict’ within the PRC’s planning practice, on one hand merged with Chinese traditional collective housing, whilst on the other hand, gradually easing planning into more real estate-driven megablock systems. Morris (2013) pointed out that, in traditional European cities, every small plot of land is orientated along the street to promote a sense of equality to ensure that every resident has a view or access to the street.

However, with the limited depth of buildings, the short edge of the street also faces its limit, forming a relatively small scale of blocks. Herein the smallness of plot and block remains the essential planning component.

By exploring the above-mentioned phenomenon through urban morphological perspective, this paper is a brief extract of an ongoing Ph.D. research, progressing in the Urban Environmental Design Lab, Hong Kong Polytechnique University. The focus hereby is to showcase examples from the massive case study section. It morphologically analysis one hundred cases, fifty Chinese and fifty overseas, selected by relevant urbanism types according to the research framework. The main objective of this paper is to test the initial framework and results, and to question whether Chinese rapid urbanization has derived a new type of urbanism.

## **Background**

Chinese urbanization is divisible into three stages according to the level of development: 1. initial period, 2. rapid development period and 3. stable saturated period (Zhu, 1997). In the past four decades, China experienced the largest and fastest industrialization and urbanization process in the history of the world. From 1978 to 2017 (38 years), China's urbanization rate increased from 17.9% in 1978 to 58.5% in 2017 (40.6% growth), with the number of permanent residents in urban areas increasing from 170 million to 810 million (476.47% growth) (National Bureau of Statistics of China, 2018). Echoed within the urban dimension, this accounts for roughly 40 years of reform that was accompanied by four decades of radical Chinese urbanization (Peng et al., 2019).

In practice, during the process of achieving modernization and urbanization, new tools and model has been applied in both Chinese and western countries' context. Benevolo (1967) raised that modern urban planning theory would be originally traced back to the earliest socialism thinking by Robert Owen, Claude Henri de Rouvroy, François Fourier and their thoughts on Utopia and utopian socialism. Modern urban planning originated from the tremendous expansion of cities in 19th century industrialization process in Europe. With the notion 'Great horse manure crisis of 1894' explained by Davies (2004), cities growth in an unprecedented rate, raising social issues for public concerns. Around 1900, theorists started to development early models guiding urban planning, trying to address the issues brought by rapid industrialization, providing people with better living environment. Under the modernization and globalization context, urban development models such as garden city, neighbourhood unit, modernism, suburbia, new urbanism, compact city, has been proposed and promoted under various background. Nevertheless, if one review Chinese modern urbanization history, none of the western urbanism model or theory can precisely and accurately interpret this unprecedented urbanization, in terms of its scale and other morphological aspects. Therefore, criticism and evaluation of Chinese urbanization cannot simply apply existing foreign theories, a systematic and comprehensive framework should be built, in addition, variables to assess this urban phenomenon is needed. In this study, the research scope is Chinese block morphology versus comparative urbanism cases.

## Methodology

The research methods adopted in this study is a mixture of qualitative and quantitative methods. The main objectives and be divided into two parts: to build up the theoretical framework of the CMU and to conduct a massive case study across selected urbanisms world widely (see Figure 1).

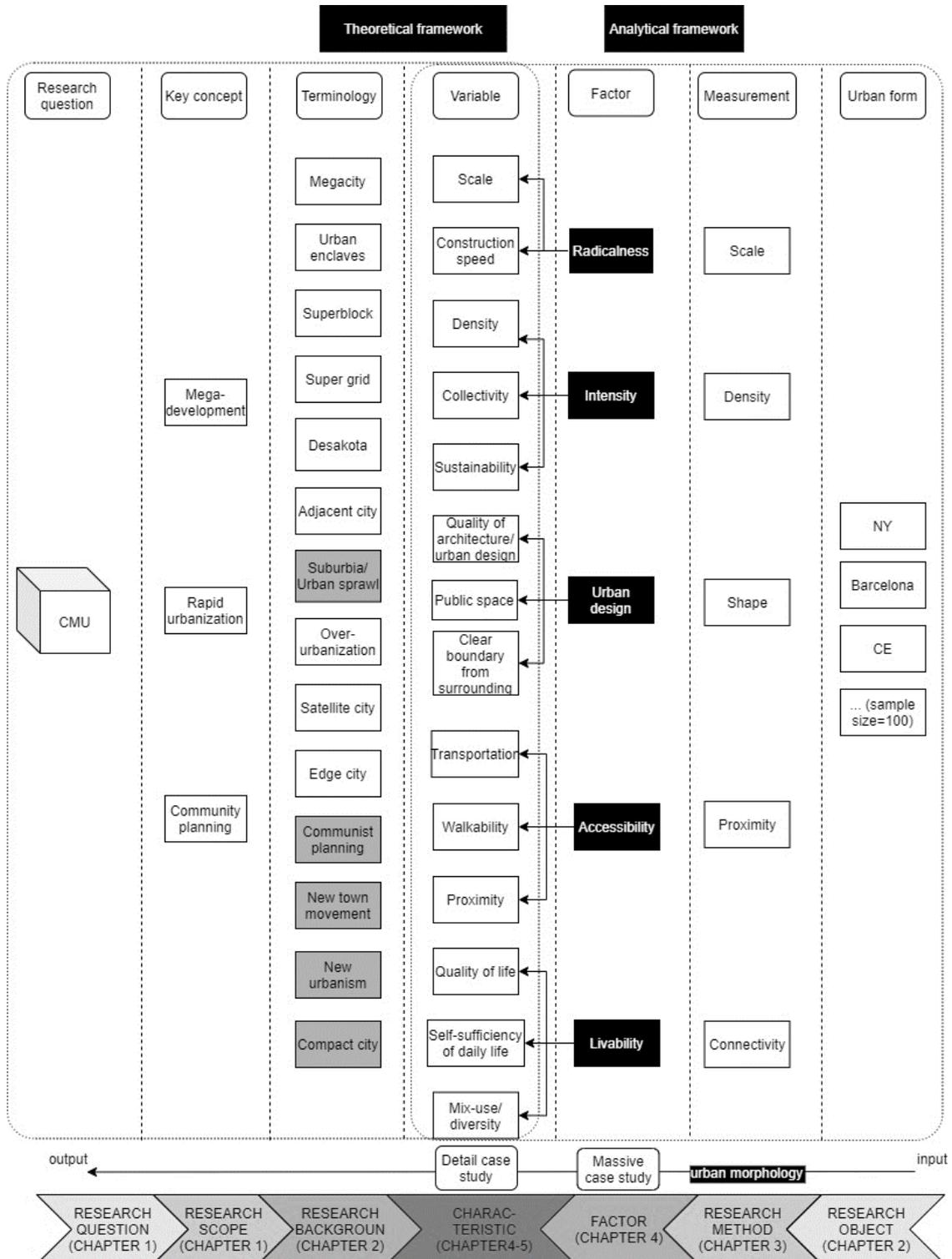


Figure 1. Framework of the initial PhD study, while this paper focus on the Analytical level of massive case study.

The theoretical framework is based on a critical literature review. Revolving around CMU, key concepts contain mega-development, rapid urbanization and community planning, relevant sub-concepts are reviewed, among which five most related urbanisms are: new town movement, suburbia, new urbanism, compact city and communist planning. While reviewing this urbanism movements, there are three main aspects that the study has extracted: definition of the movement, key factors, and representative cases. The through critically reviewing the definition and key factors of relevant urbanisms, a primitive theoretical framework of CMU is established, accompanying by expects interview, adjustment and validation of the framework is made with rigorous paradigm. As a result, it is summarized by fourteen variables under five major factor categories.

Correspond to the theoretical framework, the analytical framework is structured through an urban morphological perspective. It has been decomposed into two precisions: massive case study and detail case study. The former has one hundred cases, each assessing the five factors by urban morphological measurement. Following by the later, two detail case study which demonstrate a systematic study of CMU in fourteen spatial variables. This paper will give exemplary results from the massive case study. The raw data for analysis is based on road network downloaded from open resource OpenStreetMap, with OSMnx scripting in Python, spatial analysis is conducted by QGIS, with SAGA shape indices and sDNA. An overview of massive case study content of is shown in Table 1.

**Table 1. The analytical parametric of key factors, in massive case study section.**

Factor	Measurement	Entirety (one case)			Individual (unit within one case)		
		Value	Ranking	Visualization	Value	classification	Visualization
Scale	Block size	Mean	√	√	Each block	√	√
Shape	Length/ width %	Mean	√	√	Each block	√	√
Density	Road density	Total/ km <sup>2</sup>	√	Network	X	X	X
Connectivity	Gemma index	Test result	√	Betweenness	X	X	X
Proximity	Closeness centrality	X	X	√	X	√	√

## Results and Discussions

In each of the one hundred cases, it contains three main outcomes from the data analysis: visualization, value and ranking. The visualizations are map representations of case’s key morphological factors, which are aerial photo adapted from Google Earth, classification of block size, classification of block shape (block sphericity), road density, connectivity (betweenness test of 1200 meters), and proximity (closeness test of 1200 meters). Except for the proximity test, which is a relative result at local scale thus incomparable across cases, statistical results of other factors are listed in this section as supplementary and intuitive information. In light of the limited length in this paper, here attached two cases to demonstrate the study, they are case No.30 Del Mar

Station in Los Angeles, new urbanism case from the USA and No. 78 Zhujiang New Town in Guangzhou, CMU example from China.

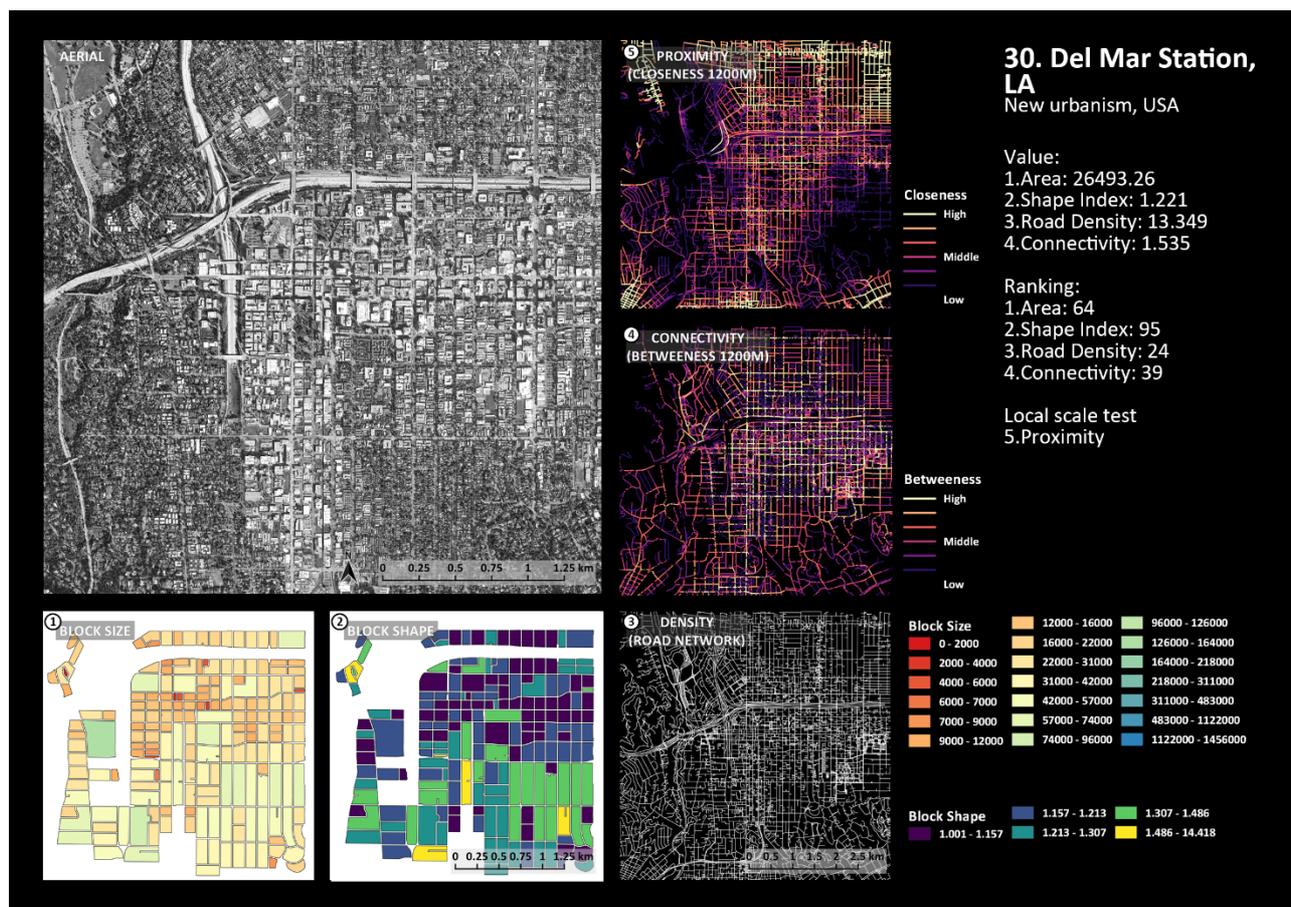


Figure 2. Case study of Del Mar Station, LA, the USA.

In Del Mar Station case, overall, its spatial layout is distinctively influenced by the intervention of highway, configuring alongside the infrastructure, gradually unfolds and concentrates with a TOD development links to the station. Its mean block size is 26493m<sup>2</sup>, median to big in western cities but relatively small compares to the overall clusters. Block shape ranking result in ninety-five, which reveals that it contains abundant narrow blocks. Its road density appears fairly high, while the cross-case connectivity result is medium high. Through the proximity test of 1200 meters (fifteen minutes' walk), district with smaller blocks are closer to each other, but the TOD development area are better connected in terms of its road configuration.

From the analysis of Zhujiang New Town case, the infrastructure network composites with hierarchy of supergrid and urban street distinctions. With a mean block area of 40931m<sup>2</sup>, the average surface is pulled down by the smaller blocks located at the west side of study area. Nevertheless, there are apparently megablocks spread in the central and eastern part. Ranking of the road density in this case is high and balance to its connectivity. The supergrid network has a higher betweenness result than the secondary roads. The proximity test result shows that blocks of lower part the case are closer to each others.



Figure 3. Case study of Zhujiang New Town, Guangzhou, China.

Following by review of the samples case by case, comparison of the inter-cases study is conducted horizontally by each of the factors, and vertically by the typological study of their interrelationship. As an brief introduction of an under progressing project, the final result will be further tested both in urban morphological aspect and statistical analysis.

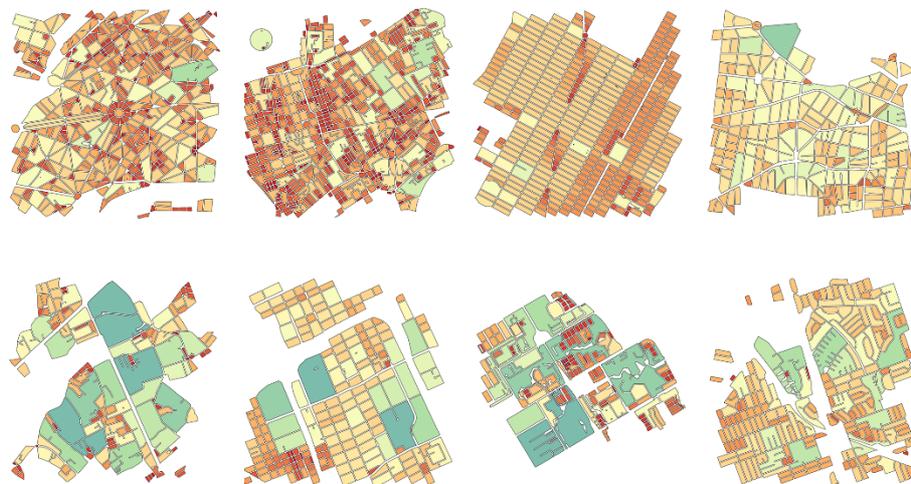


Figure 4. Examples of comparative study by block scale. From left to right, up to down: Paris, London, New York, Berlin, Marseilles Unit, Detroit, Biljmermeer, Radburn.

## Conclusions

Investigated into western urbanism theories and cases of planning and scale, as well as reviewed Chinese conditions of various aspects. This study is an attempt to open up a discussion of CMU, lessons and that we could learn from the Chinese rapid urbanization, as well as a coherent dissection of its spatial characteristics, has not raised enough attention from neither the western nor Chinese scholars. Moreover, under the nation's international strategies such as "The Belt and Road", "Asian Infrastructure Investment Bank" and "GBA", that might result in CMU model to have larger impacts both at home and abroad. What are the reasons and meanings of the context-theory-morphology in CMU and how they reveals urban spatial characteristics would gradually construct this study into an instruction guide map of the CMU.

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