

# On the Spatial Complexity of the Contemporary Chinese Cities:

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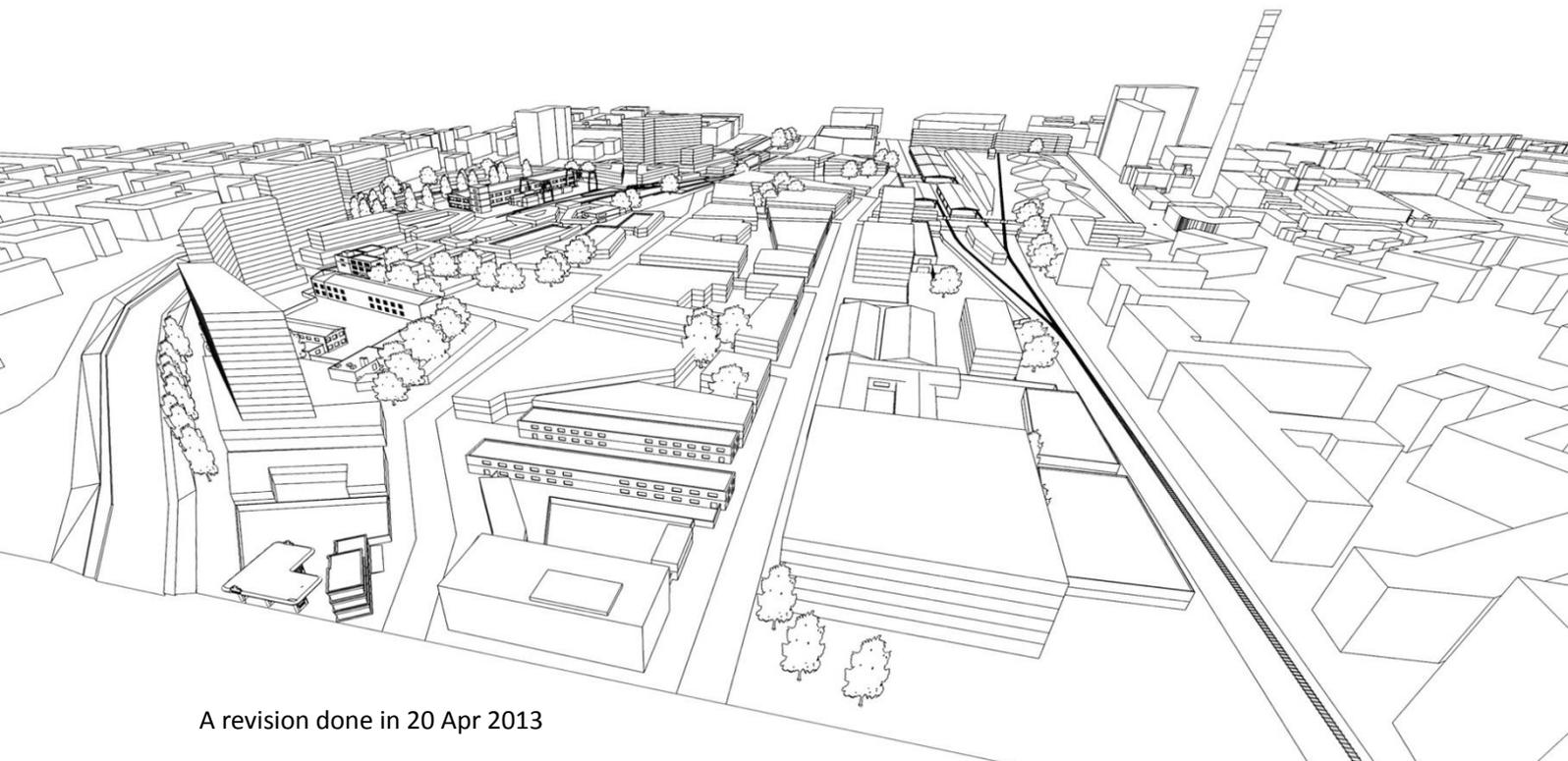
## Theories, Situation, Application

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03 Feb 2013

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Submitted in partial fulfillment of the requirements for the “Degree of Master of Science” of TU Berlin



## Statement of Authenticity of Material

*This thesis contains no material which has been accepted for the award of any other degree or diploma in any institution and to the best of my knowledge and belief, the research contains no material previously published or written by another person, except where due reference has been made in the text of the thesis.*

*Signature*

*Wentong Zhu, Berlin, 03-Feb-2013*

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## Abstract

This thesis is a study with the purpose to contribute to the development of the contemporary Chinese cities. The mode of this thesis is “applying theories to practice”, i.e. urban theories are studied first, and then the situation of the contemporary Chinese cities is described and analyzed based on those theories, and at last, a concrete and direct application of the aforementioned theories and analysis, an urban design, is introduced.

In the theoretical part, Jacobs’ planning thoughts will be introduced first, and it will be found that cities are systems of organized complexity, and they should be learned in systems approach. Then, systems theories are studied as an extension of Jacobs’ thoughts. Bertalanffy’s Organismic Conception and, further, his General System Theory (GST) and Holland’s Complex Adaptive Systems (CAS) are studied in succession and are applied to cities in order to reach some new understandings of cities. At last, various planning theories are reviewed base on the understandings that have been reached.

Then, there is the study on the contemporary Chinese cities. Problems in common in today’s Chinese cities such as zoning, super blocks, high degree of standardization, and intensively-built new cities, are summarized and described, and their consequences and reasons are analyzed. Based on these studies, suggestions on how the urban development could be better practiced are proposed.

At last, the urban design of the Inland-port of Harbin is introduced in order to see what it would be if the proposed suggestions are applied. The strategies of this design will be discussed, largely correspondent with the suggestions reached before, and the result of the design will be introduced and analyzed to see its actual effect. The practicability of the design will also be discussed to see if such kind of designs could come true soon in China.

**Key words:** city diversity, complexity of cities, systems theories, orthodox planning theories, contemporary Chinese cities.

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## Abbreviations

CAS: Complex Adaptive System  
 CEN: China Economic Net  
 CCTV: Closed-Circuit Television  
 GST: General System Theory  
 MOHURD: Ministry of Housing and Urban-Rural Development of the People’s Republic of China  
 PIPCUG: Provisions on the Indicators of the Planning and Construction of Urban Greening  
 PRC: People’s Republic of China  
 RAMURF: Regulations on the Application of the Methods for Urban Plan Formulation  
 SEZ: Special Economic Zone  
 UPRH: Urban Planning Regulations of Harbin

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# 1 Introduction

Over the last 30 years China has experienced a very fast urbanization. The country's urbanization was much facilitated by the free market policy and social and political reforms. This shows a released capacity of the country, which is why it has the power to construct more things, which is good. Meanwhile, not surprisingly, many problems emerged: social and spatial segregation, traffic jams, the loss of human scale in many urban spaces, monotonous urban spaces, brand-new built but vacant cities, etc. Then, to deal with these problems, wider roads are built with the purpose to relieve the traffic jams; benches and sporting facilities are provided in the vast and empty squares, waiting for people to use; buildings were beautified and green fields were added as a undoubted way of urban improvement; vacant cities are more intensely advertised to attract people to pay for them, meanwhile more vacant cities are being built. These means are so well presented and widely accepted in people's notion that they have become norms in the contemporary urban development in China. In small projects, one or two means are used; in larger projects, more, even all of them, will be put together to form an integrated solution. The process of integrating definitely needs some skills, just like the skills to design and assemble a machine. Different parts, the relations of the parts, the ways of their connections, and how this machine runs are considered to be well summarized, analyzed and designed. Then, all the needs of a city are considered to be fulfilled in a clear, logical and well controlled way. Together with the firm belief on green spaces, eventually cities are "green machines". Albeit there are uncountable theories, debates, and efforts in the urban planning field in China today, the fundamental principles are remarkably simple: as beautiful as gardens, and as functional as machines. In this thesis I will criticize this conception as much too narrow.

Cities are there. People have already contributed their full enthusiasm and effort for the best result, which implies that whatever the result is, they should not be too much blamed. However, this should not prevent people from evaluating the cities and reflecting upon their development, in order to improve them by way of improving our understanding of them, which may eventually bring about a better future. Many problems remain obvious, even for a well-planned and well-constructed city. To be specific, the problems are what were mentioned above, to varying degrees in different cities; to be simple, the cities do not seem to feel like real cities. More evidences supporting this argument will be given in the following chapters.

This thesis attempts to analyze the problems of contemporary Chinese cities from a Systems Theory's point of view, to reach a better understanding, and to provide some advices on how to improve the urban development in China. The social factors of cities will be much considered all through this work. Actually it is exactly the existence of social factors that makes a city much more complex than people think, and this gap between people's thought and the reality of cities is very likely to be the reason for many urban problems.

The theoretical basis of this thesis begins with the thoughts from Jane Jacobs, mainly from her book *<The Death and Life of Great American Cities>* (1961), in which she gives an impressive argument on the importance of social factors of cities and the mechanism on how cities run. Based on these, she proposes four conditions to generate diversity in big cities, which she considers to be very important in supporting the social and economic activities and, furthermore, vitality in big cities.

Jacobs was using a systems approach implicitly; she may not have clearly realized this, because systems theory was still new in the academic world of her time. This is evidenced by the last chapter of her book (1961, pp.429-433), where she quotes Dr. Warren Weaver's essay about complexity in scientific thought. It can be seen that the concept of complexity is the up limit of Jacobs' 1961 work, and complexity can be viewed as the bridge to link diversity, the main concern of Jacobs, to systems theory. Diversity is an important part of complexity, and

complexity is an important concept of systems theory: most advanced systems are characterized with high degree of complexity. Coincidentally but logically, Bertalanffy, being considered as one of the founders of systems theory, in his book *<General System Theory: Foundations, Development, Applications>* (1968), quoted precisely the same thought about complexity from Dr. Weaver (p.34). This means that Jacobs and Bertalanffy must have some basic thoughts in common, and this makes referring to Bertalanffy and his General System Theory (GST) helpful to understand more about Jacobs' thoughts. What is more, GST also provides a higher theoretical framework for urban studies.

Before formally proposing GST in 1968, *<Problems of Life: An Evaluation of Modern Biological and Scientific Thought>* (Bertalanffy, 1952) can be viewed as a prologue of Bertalanffy's thoughts on general systems. In this book, taking living organisms as the object, Bertalanffy proposes "organismic conception" as an alternative of "mechanism conception" and "vitalism conception", and also to conclude their long-term debate. He clarifies the difference between organisms and machines, summarizes some common characteristics of organisms (which partly overlap with those of cities), and states some principles, especially that why a whole system is not a simple aggregation of its composing parts.

Bertalanffy (1968) continues his thoughts on GST and classifies systems into different hierarchies (pp.28-29, Table 1.2). Cities are not included in this table, but the very high level of social-cultural system implies the high level of urban system. Bertalanffy points out that the relationships between different hierarchies must be clarified (p.29), but he did not give more elaboration specifically about city. Bertalanffy's main concern is organisms, as he is a biologist, so only part of his thoughts can be applied to cities. He mainly has a top-down approach, and holds that systems on lower hierarchies normally subordinate to those on higher hierarchies.

John Holland plays another important role in systems science. Compared with Bertalanffy, he uses a totally different, bottom-up approach. His main concern is how the numerous and various "agents" interact with each other to form a system which reaches a higher order of complexity (Holland, 1996). The approach of his work is similar to that of mechanism, but he does not set prerequisites on a system, like the required functions of a machine. His system is called "Complex Adaptive System" (CAS) and is more relative to cities compared with Bertalanffy's "organisms", and I will discuss the inspirations CAS brings about to urban studies.

The above are the overall theoretical elements of this thesis. It starts from Jacobs' empirical observations and incisive exposition on cities, and ends at systems theory, which is the theoretical up-limit of this thesis. One question is: what kind of systems are cities, if they are systems? There is not a quick answer to this question due to cities' high degree of complexity. More discussions will be provided in the following chapters. Answering this question is a very main concern of mine and I believe it is substantial for a better understanding of cities.

If cities are systems, as will be argued later, then I believe systems theory can be a tool to evaluate how a city functions and can help making urban planning more complex. If a planning method facilitates the development of a city as a system, then it should be considered as positive. Looking at Jacobs' thoughts, they amazingly match systems theory, i.e. her proposals are, in general, obviously facilitating the systematic development of cities. A city would not be merely a result of constructions, but would be a system with vitality. On another hand, the orthodox planning theories which were attacked by Jacobs from a phenomenological perspective will be theoretically reviewed in this thesis.

Then, the above understanding is the basis of Chapter 3 of this thesis—the study on contemporary Chinese cities. The aim is to analyze the aforementioned urban problems based on the understandings reached in Chapter 2, to find the reasons why these problems occur, and to make suggestions accordingly.

The historical development of Chinese cities will be reviewed in order to reach a continuous observation, as history is where the current situation comes from. I will then focus on what has happened in the recent decade. My preliminary hypothesis is that the complexity of the Chinese cities has not been respected, and many cities were even losing their complexities while more buildings were constructed. As a result, cities as systems actually retrogressed after development, which is very ironical. Different cases and my personal experiences from a wide range of contemporary Chinese cities will be referred to, in order to have a more comprehensive observation on this issue. I will suggest that the quality of governance, policies, legal status, cultural features, and a general lacking of understanding of the urban system are the main reasons of the urban problems in today's China.

As will be argued later, if the spatial complexity of a city is reached, then multiple social activities in the city could get support from the complex urban spaces, and this is very likely to facilitate the development of the city as a system. Then, as the urban problems will be identified and their reasons be analyzed, suggestions to regain spatial complexity will be proposed.

Then, the next question would be whether the proposed suggestions are applicable. To answer this question, an urban design of the inland-port of Harbin will be introduced in Chapter 4 of this thesis. The site of the design is located in the city center of Harbin. It was forsaken, disordered, and was occupied by informal dwellers and informal businesses. Problems of this site are very typical in today's Chinese cities. Normally, soon in the future, most of the informal dwellers will be driven away and new neighborhood units will be built up, precisely like the mainstream way of urban development in China. But this thesis intends to explore another possible way of urban development in China, and this design is such an example. The original situation of the site will be introduced, and strategies to improve the site will be discussed. Then, the result of the design will be shown and the result will be analyzed from different aspects to see whether the urban complexity will be improved through this design. At last, the practicability of the design will be analyzed, and various obstacles in implementing such a design will be discussed. These obstacles could well be a starter for further studies, but for this thesis, they will be the end.

## 2 Theoretical Background

This chapter provides the theoretical background for this thesis. It is a preparation for the later discussion on the Chinese cities which Chapter 3 will be mainly about.

In this chapter, Jacobs' thoughts on urban planning will be introduced and discussed first in Chapter 2.1. Then, although her observations and explanations on cities are indeed a beautiful sparkle, they are intuitive and are not theoretical enough. We will need to see where that sparkle leads to, and that is systems theory, which is beneath the surface of Jacobs' thoughts. She was implicitly using holistic approach which is a part of systems approach. Then, in Chapter 2.2, thoughts of two important scientists in systems theories, Bertalanffy and Holland, will be introduced and, in Chapter 2.3, the understandings of the systems theories will be applied to cities. At last, in Chapter 2.4, based on the understandings that have just been reached in Chapter 2.3, several important planning theories—both Jacobs's thoughts and several representative ones of the orthodox planning theories will be reviewed.

### 2.1 Reviewing Jacobs' <*The Death and Life of Great American Cities*>

In this chapter, I will review Jacobs's <*The Death and Life of Great American Cities*> (1961).<sup>1</sup> In this book, Jacobs discusses the peculiar nature of cities, which will be introduced first in Chapter 2.1.1. Based on these natures, Jacobs gets an important point that cities should be with diversity. Then, she proposes four indispensable conditions in generating diversity, which are the key thought of her 1961 work. These four conditions will also be introduced in detail in Chapter 2.1.2.

#### 2.1.1 The Peculiar Nature of Cities

Jacobs hopes that her work would be based on the real observations of the "ordinary scenes and events" in the city, with "as little previous expectation as is possible" (Jacobs 1961, p.13). What she tries to do in the first part of her book is to get a better understanding of what makes up a city and to see whether any threads of principle emerge from this understanding.

"Streets in cities serve many purposes besides carrying vehicles". Jacobs (1961, p.29) wrote this in the very beginning of her work. This implies that her work will be quite different from the orthodox city planning theories. In the orthodox planning theories, street as the carrier of transportation was indeed much considered, but its role was also mostly confined to that. Streets do have variety: the streets of Le Corbusier's Radiant City are definitely different from those of Wright's Broadacre City, but this variety is just because of different means of transportation, i.e. walking, cars, trucks, trains, etc. These means are combined in different ways (so the variety is even bigger) based on different ideas, and together with other elements, fruitful and elaborated designs can be

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<sup>1</sup> As a broader context to help understanding her work and what she is against, Jacobs lists the following books (1961, p.17): <*Garden Cities of Tomorrow*> by Ebenezer Howard; <*The Culture of Cities*> by Lewis Mumford; <*Cities in Evolution*> by Sir Patrick Geddes; <*Modern Housing*> by Catherine Bauer; <*Toward New Towns for America*> by Clarence Stein; <*Nothing Gained by Overcrowding*> by Sir Raymond Unwin; and <*The City of Tomorrow and Its Planning*> by Le Corbusier. Jacobs collectively calls the thoughts in these books as "orthodox city planning theory" (p.16). Other than these, I would like to add another two important theories that Jacobs did not mention. One is Clarence A. Perry's Neighborhood Unit, an indispensable part of orthodox planning theories, and the other is Frank L. Wright's Broadacre City, although not being broadly practiced but still very influential as an idea. Due to the space limit of this thesis, and also because these theories are so famous and influential, I will not repeat their contents in detail here. Trying to summarize them in one sentence, it would be "as beautiful as garden, and as functional as machine": garden as the vision, and machine as the approach. About these orthodox planning theories, there will be further reviews on several representative ones of them in Chapter 2.4, based on the systems theories I will introduce later.

made. These designs are often prepared by the architects or urban planners who were well trained to express their ideas, so they are always dazzlingly clear and fascinating, irresistible like “good advertisements”. But, “as to how the city works, it tells... nothing but lies” (Jacobs 1961, p.23).

### **2.1.1.1 The Use of Sidewalks**

Jacobs argues that sidewalks, the pedestrian parts of the streets, have much more uses. They are safety, contact, and assimilating children.

With regard to safety, she firstly states that “think of a city and what comes to mind? Its streets... if a city’s streets are safe from barbarism and fear, the city is... safe from barbarism and fear. When people say that a city... is dangerous... they mean primarily that they do not feel safe on the sidewalks. (Jacobs 1961, pp.29-30)” This is very convincing, as it matches to common sense. In orthodox planning theories, the issue of safety is largely neglected. Safety looks like to be excluded from the reach of urban planning—it is considered as a social problem. Therefore, sociologists, mayors, and policemen should deal with the safety issue, but not the planners, let alone the architects (although they are often doing the planning works). If there are some considerations and solutions, normally they are just passive ones, which means that unsafeness is supposed, and then people try to defend themselves by means of window railings, closed-circuit television (CCTV), hiring more security men, etc.

However, Jacobs holds that people “are not passive beneficiaries of safety or helpless victims of danger. Sidewalks... and their users are active participants in the drama of civilization versus barbarism in cities. To keep the city safe is a fundamental task of a city’s streets and its sidewalks (1961, p.30)”. The public peace is kept “primarily by an intricate, almost unconscious, network of voluntary controls and standards among the people themselves, and enforced by the people themselves (Jacobs 1961, p.32)”. It is for the people, and by the people (but not by the policemen).

As this voluntarily controlled safety network exists on the streets, the features of the streets will greatly influence the functioning of the network. To be a safe street, Jacobs listed three main qualities: (1) a clear demarcation between public space and private space, (2) eyes upon the street to take care of it, and (3) continuous users on the sidewalk.

The first quality is also an important part of orthodox planning theories. Some common points do exist between Jacobs and the orthodox planning theories, although not much. A clear demarcation clarifies which places are people’s own territories and which places are public. This is fundamental for people’s cognition, and cognition is fundamental for all follow-up behaviors.

It must be clarified that the street-level demarcation is different from district-level or regional-level demarcation. The former is merely a common architectural approach to clarify space on human scale, and it normally works. The latter should be more considered as the application of the same architectural approach on a wrong scale. This kind of demarcation is already beyond the users’ cognition (except when on a helicopter or when watching a city’s sand-table model), while it brings about segregation which is now generally considered as negative. This wrong-scale demarcation will be further reviewed in Jacobs’ work, and will also be discussed in my thesis later.

The second quality, eyes upon the street, is mainly from the houses along the street. Jacobs found that when the residents look outside the windows on the street, their attention is a natural and good tool to keep the street safe. When necessary, they will be quite prepared to interfere into a case. Just like the case described by Jacobs (1961, pp.38-39), when a man seemed to be trying to get a girl to go with him while the girl did not want to, so

many people emerged from different houses in that neighborhood. “Nobody was going to allow a little girl to be dragged off, even if nobody knew who she was. (Jacobs 1961, p.39)” Protecting the street is like protecting their own home, as street is the extension of their houses. People will feel necessary to do this. They will naturally feel themselves responsible for this, and when there is enough social capital in this neighborhood, they will be quite confident that they can keep the street safe, because they can rely on each other. This is a society, but not segregated cells. To say the least, if they do not dare to interfere, they can still call the police, as it is very easy. In this case, eyes upon the street can at least be an instant alarm to call for help.

The third quality, users on the sidewalks, can provide more eyes upon the street from themselves, and can also attract attention of people inside the houses, as “nobody enjoys looking out a window at an empty street” (Jacobs 1961, p.35). In this way, users on the sidewalks are by two means strengthening eyes upon the street. Then, to attract more users, there should be shops, bars, restaurants, etc. along the street. Jacobs argues (1961, pp.36-41) that these places will attract strangers, but strangers should not be viewed as a threat to the local neighborhood. On the contrary, strangers are a resource in big cities. The existence of strangers is a big city’s inherent nature. As long as a street has the qualities to be safe, it is able to cope with strangers, and strangers can help generating an energetic region with chance and novelty.

With regard to contact, Jacobs holds that a very important use of sidewalks is for people’s contact. For pages long in her work (Jacobs 1961, Chapter 3), she described scenes on the way people contact with others on the street or in the small shops along the street. Unlike the view point that people loitering on the streets are deplorable, Jacobs considers this kind of street behaviors as a part of big cities’ nature—public life. The meaning of public life, Jacobs writes, is to “bring people who do not know each other in an intimate, private social fashion and... to know each other... (1961, p.55)” She describes public life on a street in detail (1961, p.56) to support the assumption that all these things together can build up trust, which is very important for a city as a social existence.

However, the contact issue is also given much attention in the orthodox planning theories. Numerous meeting places, art and game rooms, outdoor benches, and green spaces are normally provided, waiting for people to use. What makes the difference between the traditional street contact and the designed contact in orthodox planning theories?

A phenomenon is that if not with the “most determined efforts and expense to inveigle users”, these places will be dead and useless (Jacobs 1961, p.58). Jacobs explains it by city privacy. She holds that the traditional street life meets the balance between people’s need for privacy and their desire for public life. A clear demarcation, as mentioned above, indicates the border of private spaces and public spaces, and people have the freedom to choose when to enjoy their privacy and when to join the public. Sidewalks and the shops along the sidewalks are a natural and convenient stage for people’s public life. Public life does not have to, and it normally does not, happen in a place where is specially designed for public life. It is rather the short, frequent, and spontaneous contacts that compose a local social network in a real sense. The shop keepers are important knots of the network. Their shops host different people in different time; people all meet him, and he contacts with everyone in a proper manner (he naturally knows what a proper manner is), with intimacy but without intruding into people’s private life if not necessary (Jacobs 1961, p.62). In one sentence, traditionally, there has already existed a well-balanced system of people’s contact, and it mainly lies in the streets.

Jacobs holds that the space and facilities provided in orthodox planning theories actually require people to “share much or nothing (1961, p.65)”. People do not like to share much, as that will be an invasion of privacy, so they share nothing. Instead of enhancing the situation, the specially designed urban system by orthodox planning theories deviates from the original balance of people’s social life. Much more arguments on the social

invalidity of this kind of design are provided in Chapter 3 in Jacobs' 1961 work, and I will mention them in the following parts of this thesis.

With regard to assimilating children, the argument is similar with that of "eyes upon the streets". Jacobs argues that children, like the adults, will find the streets much more convenient to access and more attractive. Another benefit of playing on the streets is that children will be covered by their families' attention and are therefore safer.

Children grow on the streets. "As children get older, this incidental outdoor activity... becomes less bumptious physically and entails more loitering with others... Adolescents are always being criticized for this kind of loitering, but they can hardly grow up without it. (Jacobs 1961, p.86)" The point is that children start to stay on the streets when they were still little, and they grow up there. The way of their behaviors evolves from kids into adults, and they are in this way gradually assimilated in to the society. This way of growth is closer to the reality, but not being given an ideal but remote garden and enjoying the garden free from care. Actually, the gardens, if they are empty, are often dangerous for children (Jacobs 1961, p.77). So far as I can remember, of the three times robbery I suffered when I was a boy, two of them happened in a city park. And the name of the park, ironically, is "Children's Park".

### **2.1.1.2 The Concept of Neighborhood**

Jacobs writes about neighborhood parks in Chapter 5 (Jacobs 1961). She firstly challenged the conventional thought that "parks or parklike spaces are boons conferred on the deprived populations of cities". She argues that this thought should be turned around, i.e. city parks are deprived places that "need the boon of life" (Jacobs 1961, p.89). Some parks are beloved by people, while some others are just dispirited city vacuums occupied by perverts or with rare users.

Not accepting the orthodox thought that parks are always good, Jacobs makes a comparison on four parks in Philadelphia (Jacobs 1961, pp.92-100). They are of the same age, same size, same original use, same distance away from the city center, but they have totally different situations after development for centuries. From observing and analyzing the four parks, Jacobs proposes that the most important thing is not how many parks there are or how the parks themselves are designed (although this does make sense), but is their users: how many users there are, who are the users, and at what time they are using the parks. Jacobs holds that a successful city park should be with continuous users coming from different directions and with multiple purposes. On this mechanism, a city park is similar with a successful urban street.

In Chapter 6 (Jacobs 1961), the issue of city neighborhoods is discussed. Why some neighborhoods are successful while some others fail? A common myth is that the reason is the poor living conditions, e.g. poor quality of housing, lacking green spaces, etc. Then, an inference based on that myth is that better housing and more green fields will help generating good neighborhoods. However, "a Pittsburgh study, undertaken to show the supposed clear correlation between better housing and improved social conditions... came to the embarrassing discovery that the delinquency was higher in the improved housing". This does not mean better housing is wrong; it means "others things may be more important than housing". Good neighborhoods are not merely created by "certain touchstones—schools, parks, clean housing and the like" (Jacobs 1961, p.113). This is a much more complex issue, and no simple conclusion can be made. What need to be done are the in-depth, case-by-case studies on different neighborhoods.

This study, Jacobs argues, should start from the self-government of the city neighborhoods. "Our failures with

city neighborhoods are, ultimately, failures in localized self-government. Our successes are successes at localized self-government. (Jacobs 1961, p.114)” Then, Chapter 6 is mostly a discussion about city planning with the touchstone of self-government. I would like to point out here that the concept of self-government is not only important in Jacobs’ work; it is also the link to a higher theory—systems theory. I will argue on this in the later chapters.

After describing the urban social activities and urban economy, Jacobs criticized the classical model of neighborhood in orthodox planning theory—the 7000-person neighborhood. Their calculation, the accurate and plausible number, 7000, is vain. It is based on the myth that this amount of people can support an “elementary school, convenience shopping and a community center”, and this myth is the point of departure for nearly all neighborhood renewal plans, for all project building, for much modern zoning, and also for the practice work done by today’s architectural-planning students” (Jacobs 1961, p.115). With regard to the works of architecture-planning students, my personal experience as an architecture student in my Bachelor’s time is enough to test that the same thing is happening in China right now, just like it was happening in Jacobs’s time in the US; with regard to the neighborhood renewal plans, the project building, and zoning, as will be described later in Chapter 3.2 of this thesis, they are also mostly in accordance with what are happening in today’s China.

To understand why the 7000-person neighborhood is a myth, we must understand the difference between how big cities run and how small towns run. For a town of 5000 or 10000 population, Jacobs writes, one will meet people that he already knew in other occasions when he walks on the streets. Within the limits of a town or village, the connections keep crossing and recrossing, forming a social network of acquaintance. However, the social network in bigger cities is normally not like this. A community with 5000 or 10000 population normally has no innate degree of natural cross-connections within itself. To planning such communities is “to converting cities into parcels of towns”, and this kind of town will be “full of mutual suspicion and hostility” (Jacobs 1961, p.115). Actually whether the conception of neighborhood has any meaning is questionable, because city people are mobile. The wide choice and rich opportunities are an important nature and a most unique merit of cities (Isaacs, cited by Jacobs 1961, p.115).

Jacobs holds that, from the point of view which takes cities as self-government organizations, only three kinds of neighborhoods are useful: “(1) the city as a whole; (2) street neighborhoods; and (3) districts of large, subcity size, composed of 100000 people or more in the case of the largest cities (Jacobs 1961, p.117)”.

Based on the above, she proposes the following guidelines on effective neighborhood physical planning for cities: “(1) to foster lively and interesting streets; (2) to make the fabric of these streets as continuous a network as possible throughout a district of potential subcity size and power; (3) to use parks and squares and public buildings as part of this street fabric and to use them to intensify and knit together the fabric’s complexity and multiple use; and (4) to emphasize the functional identity of areas large enough to work as districts (Jacobs 1961, p.129)”.

Later, some further, explanatory discussions are made and the flowing suggestions are given: to foster cross-use, differences, not duplications, are necessary; the proper size of an effective district should be big enough to fight city hall, but not so big that street neighborhoods are unable to draw district attention and to count (Jacobs 1961, p.130). Jacobs holds that in planning neighborhood units, these principles and like should be applied, but not the formalistic orthodox planning theories. The difference between these principles and the orthodox planning theories, she explains (p.132), is “the difference between dealing with living, complex organisms, capable of shaping their own destinies, and dealing with fixed and inert settlements, capable merely of custodial care of what has been bestowed upon them”.

By now, we have gone through the first part of Jacobs' work. I did not find much flash in her work, or many suppositions, or beautiful imaginations, or exiting revolution toward a new era, but I could see her understanding and respect on people's real life. I did not see her sympathy on the poor based on imaginations, but I could see her observation on how the poor are making efforts to improve their lives and on the mechanism how these efforts work. I could see her admiration on these, and her confidence for these people that their life will become better, gradually, by themselves.

What she is against, the orthodox planning theories, are flash, beautiful imaginations, revolutions on the way people lives, and a door to a new era which is based on many suppositions.

Jacobs' thoughts are deep into the social level of cities; it is based on the real life. She puts city streets, where most social activities happen, in a prominent position, and discovers much more social functions of the streets other than merely transportation, as is considered by the orthodox planning theories. Her recognition and respect on people's real life is so much convincing.

Truly it is possible to consider a city from a purely functional point of view, like in the orthodox planning theories. And, prompted by technical supports like automobiles, buses, metros, overpasses, and municipal facilities and like, there is infinite possibility of the way people lives. Planners and architects enthusiastically draw their imaginations, and people are with full hope, but also a ghost of worry, watching where their life will be led to. If to consider people's life partially, then any result can be reasonable and acceptable. When the neighborhoods were surrounded by iron fences, they say it is for the safety of the people living inside. When the blocks become bigger and bigger, and the streets wider and wider, they say it is to adapt to car life, and in a car you no longer need to care about the scale of the streets. When one piece and yet another piece of green spaces are provided, then it must be good, no matter whether people are using them or not. Indeed, the aesthetically trained planners and architects can always make their works look good. Therefore, the results of planning are always functionally plausible, because everything was considered (or imagined) and was more or less given a solution, and are always with obvious visual beauty.

Only after reading what Jacobs reminds us of, can it be realized that the orthodox planning theories overlook the real way of people's life so much. Jacobs wrote much about these in her 1961 work. Due to the space limitation, I will not list them comprehensively, but I will definitely borrow many of her ideas into this thesis later on.

I should clarify that I am not against, and I think Jacobs is not either, the imaginations and innovations in urban planning. But the imaginations and innovations should not be too radical. If they are so, being too far away from the current situation of people's lives, people may not enjoy them at all. Then, the time spent on their design and the money invested on their construction will be all wasted. What Jacobs calls for is a better understanding of cities and a milder and less arrogant attitude in urban planning, which fully respects people's current situation, and which might be a better way to enhance their situation gradually. Jacobs' theory is conservative compared with the orthodox planning theories, but at a time when radical theories were dominative, conservative sounds were needed to counterbalance the other side. What was more, Jacobs provided enough real observation and convincing arguments for her conservativeness. However, the radical side, the orthodox planning theories, is relatively more reliant on imaginations and suppositions which had not been adequately justified.

### **2.1.2 The Conditions for City Diversity**

In the second part of Jacobs' book (1961), she discussed the diversity of big cities and proposed four indispensable conditions to generate diversity. The word "diversity" should be given special notice, as it is as well one of the key conceptions in this thesis. The role of diversity in the whole theoretical framework will be

discussed later on.

“Diversity” reflects Jacobs’ holistic approach to urban planning. A city is not merely green space, or residential buildings, or offices, or shops, etc. It is all of them, without missing any one. And, most importantly, when all the components are put together, the way how they work together should be recognized. One fact should be realized that they, together, have formed a unit as a whole in a higher hierarchy. Without understanding of this, the overall picture people produced for a city will be really like “the blind men who felt the elephant and pool their feelings (Jacobs 1961, p.144)”. Unfortunately, in orthodox planning theories, the “elephant of blind men” is just the dominating approach.

The four conditions proposed by Jacobs are as follows. Firstly, “the district... must serve more than one primary function; preferably more than two. These must ensure the presence of people who go out doors on different schedules and are in the place for different purposes, but who are able to use many facilities in common.” Secondly, “most blocks must be short; that is, streets and opportunities to turn corners must be frequent.” Thirdly, “the district must mingle buildings that vary in age and condition, including a good proportion of old ones so that they vary in the economic yield they must produce.” Fourthly, “there must be a sufficiently dense concentration of people, for whatever purposes they may be there. (Jacobs 1961, pp.150-151)”

Although Jacobs was discussing the four conditions separately in four chapters, she pointed out that it is “purely for convenience of exposition, not because any one... is valid alone. All four in combination are necessary to generate city diversity; the absence of any one of the four frustrates a district’s potential. (Jacobs 1961, p.151)”

In Chapter 8 (Jacobs 1961), Jacobs discusses the need for mixed primary uses. The main purpose of mixed uses is to guarantee continuous users of the streets in as much time of day as possible. One fact is that one profession has its own, typical time schedule in a day. If a district has only one use, the result is that the flow of people in that district will be very concentrated: in a certain period of time, they are doing the same thing, either being on their way or staying in the buildings, working. This concentration causes rare users of streets in most time of day, when people are staying in the buildings, and too much users in a short period of time, when people are on their way.

As argued in Chapter 2.1.1.1, the above-mentioned feature makes streets less safe, as there are not enough “eyes upon the streets” in most time of day. With regard to its economic influence on the enterprises along the streets, Jacobs (1961, p.155) states as follows: “the business done by consumers’ enterprises here must be mainly crammed into some two or three hours a day, some ten or fifteen hours a week. This degree of underuse is a miserable inefficiency for any plant.” Indeed, except for some very special enterprises that can make enough profits in the very limited time, most other enterprises will be, very appropriately, miserable.

In a broader sense, mixed uses run in the opposite direction of zoning, a very widely used tool in orthodox planning. Jacobs provides rich empirical observations to support her argument, and her argument itself was an initiative at her time. Now, in line with Jacobs’ thought, there has been more theoretical support for mixed use, and more reflections on zoning. Some consider zoning to be against economic efficiency and therefore hinders development in a free economy, and a poor zoning restriction could hinder the optimal efficient usage of a given area (Wikipedia 2012, Zoning). Ottensmann (1998), reviewing researches bulk of research on the matter, summarizes that less-restrictive systems would “allow private market forces to play a greater role in establishing land uses.”

Additionally, concentration of users due to single use of a district brings about big pressure on transportation. A very common scene in big cities is: for a given road, in most time of day, the amount of traffic is very small, while

in peak hours, traffic jam lasts for hours. This will be further discussed in later chapters.

Jacobs then argued more in-depth on how different primary uses work for a city's diversity. The special terms she uses should be clarified first. Primary diversity refers to primary uses that "in themselves bring people to a specific place because they are anchorages (Jacobs 1961, p.161)", such as offices, factories, dwellings, education and recreation, etc. Secondary diversity is "a name for the enterprises that grow in response to the presence of primary uses, to serve people the primary use draw. (Jacobs 1961, p.162)" Then, her point is "when a primary use is combined, effectively, with another that puts people on the street at different times, then the effect can be economically stimulating: a fertile environment for secondary diversity. (Jacobs 1961, p.162)"

In Chapter 9 (Jacobs 1961), Jacobs discusses the need for small blocks. Of the four conditions, this one is the easiest to understand. Small blocks, as a physical feature, support urban diversity. It gives people more choice in accessing more places, and gives a certain place more possible users. In essence, it facilitates contact of different areas of a city and reduces segregation. All of these are positive for local economy.

For the open streets, the quality of small blocks is easy to be promoted: just consciously plan shorter streets. The real challenge is from the super blocks advocated by the orthodox planning theories. For a safer and quieter environment, segregation is much advocated in the orthodox planning theories. As a very popular mode of land development, big areas of land are bought, and houses are constructed; the areas, normally consist of dozens of buildings, are then encircled by fences, to achieve that safe and quiet environment. This is how super blocks are formed. However, this mode of land development is not popular only because of advocacy by the orthodox planning theories; it is also decided by legal, political and economic features of the state. It is a big issue, and it will be discussed more in Chapter 3.2.3 of this thesis.

In Chapter 10 (Jacobs 1961), Jacobs discusses the need for aged buildings. I must make a clarification immediately here in order to avoid misunderstanding. A person with even some basic knowledge in architecture or urban planning will agree that the old buildings should be protected, for cultural, historical, and aesthetical reasons. However, Jacobs' explanation is, interestingly and inspiringly, for economic reason.

Jacobs clarifies in the very beginning of this chapter that the old buildings she means here are not the "museum-piece old buildings or old buildings in an excellent and expensive state of rehabilitation", but the "plain, ordinary, low-value old buildings, including some rundown old buildings." The meaning of these buildings, she explains, is that they are affordable for the small enterprises. The big, highly developed enterprises are customers of those new and expensive buildings. But the small enterprises can only afford the cheap buildings. If there are not such cheap buildings, small enterprises cannot survive. But, as discussed in the chapter of "mixed uses" (Jacobs 1961), small enterprises are needed in a district and they are indispensable in generating diversity. Therefore, old buildings are an important condition for urban diversity.

As to how to preserve the old buildings and in what way they are used, Jacobs believes that we just need to follow the natural process of the cycling of buildings, and let the free choice of market decide their uses: "some of the old buildings, year by year, are replaced by new ones—or rehabilitated to a degree equivalent to replacement. Over the years there is, therefore, constantly a mixture of buildings of many ages and types... Time pays off original capital costs, and this depreciation can be reflected in the yields required from a building. Time makes certain structures obsolete for some enterprises, and they become available to others. Time can make the space efficiencies of one generation the space luxuries of another generation. One century's building commonplace is another century's useful aberration (Jacobs 1961, pp.189-190)."

Meanwhile, Jacobs warns that "large swatches of construction built at one time are inherently inefficient for

sheltering wide ranges of cultural, population, and business diversity (Jacobs 1961, p.191)", but that is right what orthodox planning theories advocated and expected.

In Chapter 11 (Jacobs 1961), Jacobs discusses the need for concentration. It is a long chapter, but its central idea is simple: the concentration, of both building and people, is an important condition for a city's diversity. The chapter is long because many similar concepts need to be clarified and many misunderstandings need to be corrected.

Firstly, and at first glance, the point of "concentration" appears shocking to the reader. Not only does it run against orthodox planning theories, but also, it gives people an association of overcrowding and chaos, just like the urban slums. But Jacobs argues that this is actually a misunderstanding, and the reason is "high densities of dwellings and overcrowding of dwellings are often confused (Jacobs 1961, p.255)". "High densities", she argues, "mean large numbers of dwellings per acre of land", and overcrowding means "too many people in a dwelling for the number of rooms it contains... high densities have nothing to do with overcrowding (p.255)." What Jacobs advocates is high density, but not overcrowding.

Secondly, there are different "densities" that must be distinguished. Density of dwelling means how many units of dwellings are there on a unit of land; building density, called by Jacobs "ground coverage", indicates how much ground area is covered by buildings; floor area ratio means the ratio of the buildings' total floor area to the size of total land upon which they are built and it indicates the density of available floor areas; population density is the density of people.

Jacobs gives a comprehensive argument referring to all these kinds of densities. As a result, her argument is very long. To be simple, in my understanding, the most important point is that the building density should be high. On this basis, there is no preference on whether the buildings should be high-rise or low-rise. In fact, the most ideal situation is that there are both high-rise buildings and low-rise buildings, making a mixed feature. In this way, diversity of types of buildings is achieved.

High building density, Jacobs argues, seems to be indispensable for diversity. The reason is that if not, if "so much land is left open," then "the land itself is being used 'inefficiently'. (Jacobs 1961, p.215)" To provide a required amount of floor area in such a limited part of covered ground, say, 25%, which is a common figure, the architects have to rigidly standardize the buildings in the optimum way. We do not need to worry about the architects, as they are well trained to find the architectural optimum. What really needs to be worried about is that standardization is the enemy for diversity. Once the buildings in a district are standardized, "great diversity in age and types of buildings (p.212)" is removed, and thereupon the "diversity of population, diversity of enterprises and diversity of scenes" will be seriously blown.

In this chapter, Jacobs also discusses what are proper densities for city dwellings. She emphasizes first that "proper city dwelling densities are a matter of performance. They cannot be based on abstractions about the quantities of land that ideally should be allotted for so-and-so many people. (Jacobs 1961, pp.208-209)" Then she holds that "right amounts are right amounts because of how they perform, and what is right differs in specific instances. (p.209)" Following this point, she gives further arguments based on several cases (pp.209-217), e.g. Rittenhouse Square in Philadelphia, North Beach-Telegraph Hill in San Francisco, Back-of-the-Yards in Chicago, Stuyvesant Town in Manhattan, etc. For each case she described its current density and analyzed the whole situation to judge whether the density is higher or lower than it should be. I will not quote any specific figure she gives, because a figure makes sense only when it is put into the context. But I can quote the range of the figures she gives, which is "in between 100 and 200 dwelling units per acre".

These four conditions are the main thoughts of Jacobs' book. They are based on the observation and understanding of people's real life. They are seriously in conflict with the orthodox city planning theories. Some conflicts are even irreconcilable because they are conflicts on basic values. The debate between these two lines of thoughts will be constant.

### 2.1.3 Summary

To summarize Chapter 2.1, Jacobs has well argued on the peculiar nature of cities and has proposed four conditions for city diversity. About the nature of cities, she especially emphasizes the importance of sidewalks and argues that sidewalks have three more uses: safety, contact, and assimilating children. According to these uses, she discusses some qualities for the safety of streets, discusses why the traditional street spaces facilitate people's contact and the new spaces provided by orthodox planning theories hamper people's contacts, and discusses how healthy streets assimilate children into the society and the significance of this. Jacobs also discusses neighborhood parks and city neighborhoods. She argues that neighborhood parks should be with continuous users in different time of day and that successful city neighborhoods are essentially due to their localized self-government which provides an internal dynamic. Based on this point, she criticizes that the 7000-people neighborhood unit in orthodox planning theories is a myth which does not fit big cities, and proposes the kinds of effective city neighborhoods and guidelines on effective physical planning of such neighborhoods. Along Jacobs' argument, the concept of city diversity emerges and is justified as a very essence of cities.

Then, the four conditions Jacobs proposes were introduced. They are mixed primary uses, small blocks, aged buildings, and concentration of people. These points are mostly in conflict with many doctrines in orthodox planning theories, and Jacobs defends her principles with convincing arguments.

Other than the aforementioned contents in this chapter, part 3 and Part 4 of Jacobs' book further discuss various aspects of urban systems and different tactics in dealing with problems of cities. The coverage of discussions includes the negative effect of border vacuums, the slum problem, gradual money and cataclysmic money, subsidizing dwellings, automobiles, visual order of cities, salvaging the public housing projects, and governing and planning districts. They are more specific cases to help better explain her main thoughts. I will not review them here, but I will mention them where necessary later in this thesis.

Suppose people's customary way of life should be respected, and suppose the way of urban economy described by Jacobs is right and it should therefore be facilitated, then Jacobs' thoughts seem to be convincing enough to beat the orthodox planning theories. However, these suppositions are not self-evident. A more in-depth study on both Jacobs' thoughts and orthodox planning theories is still desirable, and that would be where the hope of a better understanding of cities lies in. As mentioned in Chapter 1 of this thesis, systems theory can provide a framework for this kind of study, and I will write about it in the rest part of Chapter 2 of this thesis.

The above, concentrated review on Jacobs' thoughts is not complete yet, and her thoughts will still be followed up later in the course of this thesis. In the next chapter, I will start to link Jacobs' work to a higher theory—systems theory.

## 2.2 From Jacobs to Systems Theory

Jacobs' *<The Death and Life of Great American Cities>* was published in 1961: the book is old. But, as science kept developing, her work does not seem to be outdated; on the contrary, it endures the test of more recent theories, and it seems even more like a prophet.

What I mean by “the development of science”, more specifically, is systems theory. This theory can be traced back to the debate between machine theory, in which life is conceived as something like machine and its structure is all that machine-like life is about, and vitalism, in which some mysterious, soul-like things are considered as the final force to drive lives, in trying to explain the phenomenon of life. It was Bertalanffy, in the 1920s, who firstly proposed “organismic conception” as an attempt to conclude the long debate between machine theory and vitalism. He, very early, realized the necessity to view a living organism as a whole system, but not purely as an aggregation of separate parts. Later, a lot of findings were discovered based on this holistic thought. Bertalanffy holds that not only in biology, many complex entities in other fields should also be viewed as whole systems. As a cross-disciplinary approach, and as a final summarization of organismic conception, Bertalanffy (1952, Chapter 6) proposed General System Theory (GST). GST is the study taking general systems as the objects. Although “systems” is an abstract conception, there are certain rules and principles for it. It makes sense to study these rules and principles, and then, as the conception of systems is interdisciplinary, the research findings from the abstract systems can be applied to many concrete subjects such as physics, biology, psychology, sociology, philosophy, etc. GST is a bridge between different subjects, and Bertalanffy (Bertalanffy 1952, Chapter 6) expects it to be the bridge toward the unity of science.

In this chapter, I will firstly reveal how Jacobs' thoughts could be linked to systems theory. Then, Bertalanffy's organismic conception and General System Theory will be introduced and discussed. At last, another important theory, Holland's Complex Adaptive Systems, will as well be introduced and discussed.

### 2.2.1 The Ending of Jacobs' Theory and Its Extension

Jacobs did not directly quote systems theory in her 1961 classic. All through that work, there is no reference to “systems theory”. However, she was using systems approach implicitly by talking about “organized complexity”. Her thoughts appear to be in line with Bertalanffy's thoughts. In the last chapter of Jacobs' work (1961), she quoted the history of scientific thought written by Dr. Warren Weaver as a key theoretical support for her own book. Although the text, including both Weaver's original writing and Jacobs' comments, is very long, I shall still quote it here, as it is also very important for the later-on arguments in this thesis.

*“Dr. Weaver lists three stages of development in the history of scientific thought: (1) ability to deal with problems of simplicity; (2) ability to deal with problems of disorganized complexity; an (3) ability to deal with problems of organized complexity.*

*Problems of simplicity are problems that contain two factors which are directly related to each other in their behavior—two variables—and these problems of simplicity, Dr. Weaver points out, were the first kinds of problems that science learned to attack:*

*‘... During that three hundred years (17<sup>th</sup>-19<sup>th</sup> century), science developed the experimental and analytical techniques for handling problems in which one quantity—say a gas pressure—depends primarily upon a second quantity—say, the volume of the gas. The essential character of these problems rests in the fact that... the behavior of the first quantity can be described with a useful*

*degree of accuracy by taking into account only its dependence upon the second quantity and by neglecting the minor influence of other factors.*

*These two-variable problems are essentially simple in structure... and simplicity was a necessary condition for progress at that stage of development of science.*

*... vast progress could be made in the physical sciences... It was this kind of two-variable science which laid... the foundations for our theories of light, of sound, of heat, and of electricity...'*

*Then, after 1900, a second method of analyzing problems was developed by the physical sciences.*

*'Some imaginative minds [Dr. Weaver continues] rather than studying problems which involved two variables or at most three or four, went to the extreme, and said, 'Let us develop analytical methods which can deal with two billion variables.' That is to say, the physical scientists developed powerful techniques of probability theory and of statistical mechanics which can deal with what we may call problems of disorganized complexity...''*

*(Jacobs 1961, pp.429-430)*

Dr. Weaver refers to the balls on a billiard table, as an example of disorganized complexity:

*"... The classical dynamics of the nineteenth century was well suited for analyzing and predicting the motion of a single ivory ball as it moves about on a billiard table... One can, but with surprising increase in difficulty, analyze the motion of two or even three balls on a billiard table... But as soon as one tries to analyze the motion of ten or fifteen balls on the table at once, as in pool, the problem becomes unmanageable, not because there is any theoretical difficulty, but just because the actual labor of dealing in specific detail with so many variables turns out to be impractical.*

*Imagine, however, a large billiard table with millions of balls flying about on its surface... The great surprise is that the problem now becomes easier: the methods of statistical mechanics are now applicable. One cannot trace the detailed history of one special ball, to be sure; but there can be answered with useful precision such important questions as: On the average how many balls per second hit a given stretch of rail? On the average how far does a ball move before it is hit by some other ball? ...*

*... The word 'disorganized' applies to the large billiard table with the many balls... because the balls are distributed, in their positions and motions, in a helter-skelter way... But in spite of this helter-skelter or unknown behavior of all the individual variables, the system as a whole possesses certain orderly and analyzable average properties...*

*A wide range of experience comes under this label of disorganized complexity... The laws of thermodynamics, which describe basic and inevitable tendencies of all physical systems, are derived from statistical considerations. The whole structure of modern physics... rests on these statistical concepts."*

*(Weaver, cited by Jacobs 1961, pp.430-431)*

The statistical concepts, as Weaver lists, can be applied to large telephone exchange, predicting the average of

frequency of calls, the probability of overlapping calls of the same number, the finance stability of a life insurance company, analyzing motions of the atoms and analyzing motions of the stars in the universe, etc.

However, as Jacobs (1961, p.431) continues the argument, “by no means all problems could be probed by this method of analysis... Life sciences were neither problems of simplicity nor problems of disorganized complexity; they inherently posed still a different kind of problem, a kind of problem for which methods of attack were still very backward as recently as 1932...”

She then continues to quote Dr. Weaver’s writing for the third kind of problem:

*“... The number of variables involved is moderate—large compared to two, but small compared to the number of atoms in a pinch of salt... Much more important than the mere number of variables is the fact that these variables are all interrelated... These problems, as contrasted with the disorganized situations with which statistics can cope, show the essential feature of organization. We will therefore refer to this group of problems as those of organized complexity.*

*What makes an evening primrose open when it does? Why does salt water fail to satisfy thirst? ... What is the description of aging in biochemical terms? ... What is a gene, and how does the original genetic constitution of a living organism express itself in the developed characteristics of the adult? ...*

*All these are certainly complex problems. But they are not problems of disorganized complexity, to which statistical methods hold the key. They are all problems which involve dealing simultaneously with a sizable number of factors which are interrelated into an organic whole.”*

*(Weaver, cited by Jacobs 1961, pp.431-432)*

I should point out immediately here that the above thoughts of Dr. Weaver is precisely referred to, although not fully quoted, in Bertalanffy’s 1968 work <*General System Theory: Foundations, Development, Applications*> (p.34).

Jacobs continues her review: “Dr. Weaver tells us, that if the life sciences could make significant progress in such problems (organized complex problems), then there might be opportunities to extend these new techniques, if only by helpful analogy, into vast areas of the behavioral and social sciences. (Jacobs 1961, p.432)”

Jacobs briefed, in an admiring tone, the progress in the life sciences: “They have accumulated, with extraordinary swiftness, an extraordinary quantity of hitherto hidden knowledge. They have also acquired vastly improved bodies of theory and procedure—enough to open up great new questions... But this progress has been possible only because the life sciences were recognized to be problems in organized complexity, and were thought of and attacked in ways suitable to understanding that kind of problem... Life sciences... tells us that problems of this kind can be analyzed—that it is only sensible to regard them as capable of being understood, instead of considering them... to be ‘in some dark and foreboding way, irrational.’ (Jacobs 1961, p.432)”

Then, Jacobs (1961, p.433) writes that “cities happen to be problems in organized complexity, like the life sciences. They present ‘situations in which a half-dozen or even several dozen quantities are all varying simultaneously and in subtly interconnected ways.’ ... The variables are many, but they are not helter-skelter; they are interrelated into an organic whole.”

She (1961, p.435) then points out that the modern thought about cities is “unfortunately very different from the history of modern thought about the life sciences. The theorists of conventional modern city planning have consistently mistaken cities as problems of simplicity and of disorganized complexity, and have tried to analyze and treat them thus.” The essential reason, says Jacobs, is the “great disrespect for the subject matter itself—cities”, and these misapplications should be “halted out in the light, recognized as inapplicable strategies of thought, and discarded.”

Then, Jacobs (1961, pp.435-436) analyzes the orthodox planning theories, mainly on Howard’s and Corbusier’s, on the basis of the three kinds of problems. She holds that Howard’s Garden City is to view cities as problems of simplicity, prominently evidenced by a pair of major variables—quantity of housing and the number of jobs. Radiant City by Le Corbusier, she continues to write, had started to view cities as problems of complexity, but unfortunately of unorganized complexity. Corbusier’s scheme’s high reliance on statistical results proves this opinion.

Jacobs continues to write that with the statistical techniques, orthodox planning theories seemed to be more optimistic than before. They seemed to be more “rational”, “accurate”, “proper”, and “scientific” (1961, pp.436-438). However, it must be pointed out that their understanding of the kind of problem is wrong. It had been the time to tear down the tower of orthodox planning theories that was built entirely on plausibility, and to build up a better understanding of cities based on the new assumption that cities are problems of organized complexity.

As to how to study cities based on the new paradigm of organized complexity, Jacobs (1961, p.438) refers to life science again: “life sciences... have provided hints about analyzing and handling this kind of problem. These advances have, of course, filtered from the life sciences into general knowledge; they have become a part of the intellectual fund of our times.” After some follow-up arguments, Jacobs (1961, p.440), taking inspirations from the life sciences, proposed three most important habits of thought in understanding cities: “(1) to think about processes; (2) to work inductively, reasoning from particulars to the general, rather than the reverse; and (3) to seek for ‘unaverage’ clues involving very small quantities, which reveal the way larger and more ‘average’ quantities are operating.”

So far I have been elaborating Jacobs’ thoughts only. However, it should have been clear that her keen interest in the complexity of cities was well related with GST.

As have been argued before, systems theory is a theory that includes and that helps better theorizing Jacobs’s thoughts, it is therefore necessary to refer to systems theory in more detailed fashion, albeit briefly. In doing so, I would like to firstly refer to General System Theory (GST) of Bertalanffy, one of the initiatives of systems theory. Jacobs’ thoughts are actually in line with Bertalanffy’s thoughts, evidenced by their coincidental but reasonable quotations of Dr. Weaver’s thought respectively. This can also be evidenced by the fact that Jacobs referred to life sciences many times in her work. Although she did not directly quote the name “Bertalanffy”, considering the time and contents of their works, it is very likely that Bertalanffy’s work is, at least a part of, what is called by Jacobs, the “advances in life sciences (Jacobs 1961, p.442)”.

### **2.2.2 Bertalanffy’s Organismic Conception: A Prologue**

Before going deeper into Bertalanffy’s General System Theory, it is necessary to refer to his earlier works on life sciences first. They are that kind of works that, described by Jacobs (1961, p.438), “have provided hints about

analyzing and handling this kind of problem (organized complexity)”.

In this chapter, I will review the thoughts in Bertalanffy's <*Problems of Life: An Evaluation of Modern Biological and Scientific Thought*> (1952). This is a book that summarizes his works on life sciences by then in 1952. The key object of this book is “organisms”, which seems to be a subject far removed from cities. However, much of the biological principles are principles of systems, and are actually also applicable to cities. Of course, such kind of trans-application must be based on careful analysis and proper reasoning. But this kind of transfer of knowledge and mutual inspiration between different fields is indeed the significance of systems theory.

Karl Ludwig von Bertalanffy is a biologist, and is one of the founders of systems theory. In his 1952 book, he mainly contributed two points to the science world: (1) the proposal of organismic conception and (2) the proposal of General System Theory.

There had been a long debate in life sciences on what, or who, caused the amazingly intricate processes of life. Some explain it with mechanistic conception. Basically, there are two meanings in mechanistic conception. The first one is that life processes, on their essence, are driven and ruled by those “forces and laws which are also present in inanimate nature. (Bertalanffy 1952, p.7)” In line with this, its proponents believe that life can be reduced into some basic physical-chemical processes. The second one is that “the arrangement of events characteristic of all processes in the cell and the organism is interpreted in terms of structural conditions. (Bertalanffy 1952, p.7)” In line with this, it is believed that structure is what life is all about, and therefore the advances on the understanding of living organisms' structures will answer the problems of life.

Some others hold another conception, vitalism, to explain the problems of life. “Vitalism denies the possibility on a complete physical-chemical explanation of life and maintains an intrinsic difference between the living and the non-living (Bertalanffy 1952, p.7)”. As their viewpoint, the highly complicated processes of living, e.g. self-maintenance, regulation after disturbance and like, is obviously beyond the explanation merely by physical-chemical processes and structures. The thing they use, or imagine, to explain lives is “entelechy”, a soul-like existence beyond the universe; it stands behind lives and is actually directing and regulating lives. Vitalism, Bertalanffy says, is just trying to lead the problems that cannot be solved now to some mysterious elements: “vitalism says nothing else than that the essential problems of life lie outside the sphere of natural science. If that were so, then scientific research would become pointless... (Bertalanffy 1952, p.8)”

Until the late 19<sup>th</sup> century, as life science kept developing and more phenomena were better investigated and explained, vitalism had been nearly argued down. However, that does not mean that mechanistic conception had won the debate. Actually, there had emerged important evidences that living organisms were more than mechanical structures. Bertalanffy (1952) points out that the fundamental difference between a machine and an organism is that for the former, the substances that compose it always remain the same; while for the later, although it also has a clear structure, the substances that compose it are continuously flowing, either circulating inside or exchanging with the out environment.

This gives a hint for understanding cities. Spaces in cities are fixed at a given moment; if we look at a city from a bird's eye view, for one second, it is indeed like a machine, composed of many elements and in some ways organized. However, if we look at it longer—say just three seconds, one fact becomes undeniable: its users, people, are always moving. Mobility is a city's essence. In some cases a city may seem like to be staying still, for example in a draft of planning or as a model to be exhibited, but this is merely because of certain necessary practicality and understandability, because of the limitations of our approaches which make us unable to show the cities' nature of mobility all the time. But we should always keep in mind that it is the people, moving, in the cities that make cities alive. The flow of people is everything cities are about, and the purpose of cities, in a sense,

is to support the flow of people. More broadly, the flows in cities also include the flows of materials and the flows of capital, characterizing cities with a more intense degree of flowing. From this viewpoint, cities are obviously more than machines; the characteristic of their flowing makes them more like organisms. However, as to whether cities can be really viewed as organisms (or other things alike), it is still too early to reach a conclusion here, but I will try to discuss on this issue later.

Coming back to Bertalanffy, he proposes “organismic conception” as a conception that is beyond mechanistic conception and vitalism conception. There are three main meanings in organismic conception. It is (1) a conception of whole systems, which opposes the approach of analysis, i.e. mainly accumulation and reduction, (2) a conception of dynamic, which opposes the theory of being static and mechanic, and (3) a conception of active systems, which opposes the theory of “organisms are passive, reactive systems” (Bertalanffy 1952, Chapter 1).

Bertalanffy elaborated much to justify organismic conception. Although the proofs he listed are all in biological field, they are inspiring for cities, and I will provide a brief introduction of them below<sup>2</sup>.

To prove the wholeness of organism, the way gene works and the coordination of organs are discussed. A complete chromosome is composed of huge amount of fragments, which makes it a perfect object to apply reductionism, i.e. tracing back to how the basic units function, aggregating them, and the result should be equal to the whole. If this is true and the gene’s mechanism is merely as simple as aggregation, then even if a big segment of chromosome is missing, the chromosome should still make sense (but of course in a different way). However, a fact is that “loss of sections of chromosomes is always lethal (Bertalanffy 1952, p.57)”. This means that gene is not just an aggregation thing; it is a whole. In line with this, if one leg of a crab or a beetle is removed, the coordination of their rest legs will be rebuilt, forming a new whole. This means that an organism, as long as it functions, tend to maintain itself as a whole. The concept of coordination is a concept on the level of systems, whose level is higher than that of reductionism. But of course, this does not mean that the role of basic physical-chemical process should be played down. It just means that there are certain laws that are still waiting to be discovered in the problems of life. Once they are discovered, they will be integrated into the total knowledge of life science.

As to the dynamic feature of organism, Bertalanffy holds that the essence of organisms lies in a process called “dynamic order”, but not merely in their static structures. Actually the structure changes a lot during the developmental stage of an organism; what always remains is its dynamic order. When an organism dies, it is actually the death of its internal dynamic processes, while its static structure is still there, unchanged within a short time. Bertalanffy also argues that the development of an organism’s structure is characterized by a “gradual mechanization” (1952, Chapter 3), i.e. the more it is developed, the more its cells lose the ability of changing its kind of cell to form different organs. In this process, multiple potential in its early stage develops into a single but strong function. This is to gain extra advantage by specialization, but with the cost of the loss of flexibility.

As to the feature of activeness of organisms, Bertalanffy firstly argues against the opinion that organisms are in physical-chemical balance. He argues that an organism is rather in a “steady state”, a state which is a certain distance away from balance. Organisms need the input of energy to maintain their steady states, and the energy is stored as potential energy inside the organisms for possible activities, either actively or passively. The change of external environment is not to cause a new process upon an organism; it is more to modify the processes that have been already existed inside the organism. In essence, what fundamentally decide the processes are the conditions inside the organism (although further details about how the processes are generated are still unknown).

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<sup>2</sup> It needs to be pointed out that, considering the time of the book (1952), there must be some facts that are now no longer correct or, at least, accurate. Therefore, the focus should be more on the principles shown from the facts, but not on the facts themselves.

The above are very important characteristics of organisms, but they are also what make relevant studies very difficult. These issues cannot be analyzed by traditional approaches; their complexity is much higher and it therefore calls for new approaches. In his 1952 work, Bertalanffy has already realized that if a very complex system is stratified into different levels, the problems might be more approachable. He holds that biology shoulders the task of stratifying all systems in life sphere, and of summarizing principles and laws on different levels. As this thought is better explained in Bertalanffy's another work in 1968, more reviews will be made later where relevant.

But here, Bertalanffy has already proposed an important view: organisms are open systems. Here are several fundamental points of open system: (1) the second law of thermodynamics only applies to close systems, but not open systems, i.e. it does not apply to organisms; (2) for an open system, what makes it more than structure is its dynamic order, and the input of energy is a prerequisite to maintain this order; (3) for an open system, in the process of its moving toward the steady state, it is very likely that its entropy decreases and its inhomogeneity increases: in this way the system is moving toward a higher complexity.

So far, Bertalanffy's studies are all on single organisms. From a broader scope, bigger units, the biological communities, naturally come into sight. Biological communities are agglomerations of different species of organisms. There has been an opinion that a biological community can be viewed as a meta-organism, i.e. the agglomerated organisms, together, have formed a single organism in a higher hierarchy. Is it true? This is a fundamental question. In life sciences, it decides how we understand the biosphere; in social sciences, it decides in what way our society will be organized.

Bertalanffy firstly agrees that biological communities are systems, because they are composed of different components that interact with each other, and because of their typical characteristics of systems: interdependence, self-regulation, restoration after disturbance, moving toward (but not necessarily reaching) balance, etc. (Bertalanffy 1952, Chapter 3) However, the degree of integration of biological communities is normally obviously lower than that of organisms; they are loose, non-centralized units. Therefore, there are enough reasons to view biological communities as systems, but they definitely have not reached the level of meta-organism.

Further, Bertalanffy asks, is it reasonable to view a biological community as a unified system? If it is a unified system, then it somehow implies that its internal components, i.e. the different organisms, should be well coordinated and therefore coexist in a peaceful way. However, the fact is that competitions among species and among individuals are universal. They compete for sunlight, nutrients, spaces, etc. Actually, even inside a single organism, there are still competitions: in a hungry animal, less important tissues are consumed to maintain the important ones; in the developmental stage of an organism, the developments of different parts are much driven by the rivalry for nutrients. Therefore, competition exists in all biological systems—both organisms and higher units of lives. This, Bertalanffy argues (1952, Chapter 3), leads to a basic notion of philosophy which can be traced back to Heraclitus' time: the whole world and entities on all levels are unities of opposites. In the process of struggling against each other, individuals are annihilated, and a higher "whole" is gradually achieved.

Bertalanffy then stops his argument on this issue in his 1952 work. He revealed the universality of competition in lives, and philosophically explained how this helps to achieve higher wholes. But he did not give further comment on this issue. "Annihilation of individuals" may give people a trace of unease, because for each individual, he is all of himself. If being annihilated, no matter how great the achieved whole is, it does not make any sense to him. Therefore, there is a certain danger in transplanting this theory to the human society. Our social system indeed needs to develop, but should it be beyond individual people? What is the role of people in front of the whole society, and should people's nature be protected? In what way can we protect individuals

from being “annihilated”, but at the same time maintain the development of the whole social system? Bertalanffy did not answer these questions here, but in his 1968 work, he provided a short but single chapter to argue on this. Further reviews and arguments will be provided in Chapter 2.3.1 of this thesis.

The final generalization of organismic conception, Bertalanffy writes, leads to the proposition of General System Theory (Bertalanffy 1952, Chapter 6). GST is a new field of science, a logical-mathematical field. As mentioned before, there are certain laws and principles for the abstract “systems”, which can be generally applied to many subjects. Bertalanffy holds that the role of GST in all sciences is comparable to that of probability theory in mathematics; the theory itself is purely formal, but it applies to many other practical fields. Bertalanffy elaborated much more on GST in his another book in 1968, which generalizes his former works and provides a more exhaustive exposition on GST. I will give review on GST in the next chapter of this thesis.

### **2.2.3 Bertalanffy’s General System Theory**

As mentioned above, Bertalanffy’s 1968 classic, *<General System Theory: Foundations, Development, Applications>* extends his earlier works and elaborates more on GST. Basically, his 1968 work is (1) a rewriting of his 1952 work, but with more updated evidences and polished arguments, (2) an exhaustive exposition on GST, much more than that in his 1952 work, and (3) a primary discussion on how GST applies to other fields such as sociology, history, psychology, etc.

In the last chapter, point (1) is already largely covered. Therefore, in this chapter, I will mainly review on point (2) and the sociological part of point (3), which is closely related to cities.

#### **2.2.3.1 General Approaches**

The development of science calls for new approaches. Bertalanffy paraphrases Warren Weaver’s exposition on different kinds of problems (which also appears in Jacobs’ 1961 work (pp.429-432) and which is quoted in this thesis in Chapter 2.2.1), and writes “... the fundamental problem today is that of organized complexity. Concepts like those of organization, wholeness, directiveness, teleology, and differentiation are alien to conventional physics. However, they pop up everywhere in the biological, behavioral and social sciences, and are... indispensable for dealing with living organisms or social groups. Thus a basic problem posed to modern science is a general theory of organization. (Bertalanffy 1968, p.34)”

General System Theory, Bertalanffy writes, is “capable of giving exact definitions for such concepts and, in suitable cases, of putting them to quantitative analysis. (Bertalanffy 1968, p.34)” Generally, the aims of GST are: “(1) there is a tendency towards integration in the various sciences, natural and social; (2) such integration seems to be centered in a general theory of systems; (3) such theory may be an important means for aiming at exact theory in the nonphysical fields of science; (4) developing unifying principles running “vertically” through the universe of the individual sciences, this theory brings us nearer to the goal of the unity of science... (Bertalanffy 1968, p.38)”

Bertalanffy then gives a brief introduction (1968, pp.19-23) of the different systems approaches summarized by Drischel. Some of these approaches are relevant to the society and the cities, including “Classical” system theory<sup>3</sup>,

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<sup>3</sup> “Classical” system theory applies calculus as a key tool. It aims to state principles which apply to systems in general or defined subclasses, to provide techniques for their investigation and description, and to apply these to concrete cases. Statistical mechanics models can be used on analyzing traffic flows; allometric analysis can be used on social systems (Bertalanffy 1968, p.19).



By setting specific conditions to Equation 2.2.3-1, Bertalanffy discusses the problem of growth. After some follow-up mathematical reasoning, exponential law and logistic curve are reached. The former can be applied on the unlimited growth or decrease of a population, whose birth rate and death rate are both fixed; the latter can be applied on the growth of human populations with limited resources. Bertalanffy then argues “certain laws of nature can be arrived at not only on the basis of experience, but also in a purely formal way... Such laws are... independent from their physical, chemical, biological, sociological, etc., interpretation... Such examples show a formal uniformity of nature. (Bertalanffy 1968, pp.62-63)”

With the same method, the problem of competition is discussed. Skipping the mathematical details again and only mentioning some interesting findings, “competition of two species for the same resources is, in a way, more fatal than a predator-prey relation. Competition eventually leads to the extermination of the species with the smaller growth capacity; a predator-prey relation only leads to periodic oscillation of the numbers of the species concerned.” He follows to write “it may well be that they (the above relations for biocoenotic systems) have also sociological implications. (Bertalanffy 1968, p.66)”

Bertalanffy gives elaborated exposition on “wholeness, sum, mechanization, and centralization” (Bertalanffy 1968, pp.66-75). He firstly states that there are systems as wholes and systems of independence respectively—they can all be mathematically given clear definitions (Bertalanffy 1968, pp.66-67). He then points out that under certain conditions, an organism “passes from a state of wholeness to a state of independence of the elements... We may call this progressive segregation (Bertalanffy 1968, p.68).” This kind of progressive segregation is very common for organisms, and its significance is that it “implies an increase of complexity in the system.” Bertalanffy continues to argue: “in this contrast between wholeness and sum lies the tragical tension in any biological, psychological and sociological evolution. Progressive mechanization... implies loss of regulability... The more parts are specialized in a certain way, the more they are irreplaceable, and loss of parts may lead to the breakdown of the total system. (Bertalanffy 1968, p.69)” Relating this to the society, Bertalanffy writes that “an amorphous mob has no ‘individuality’; in order that a social structure be distinguished from others, grouping around certain individuals is necessary. For this very reason, a biocoenosis<sup>10</sup> like a lake or a forest is not an ‘organism’, because an individual organism always is centered to a more or less large extent. (Bertalanffy 1968, p.73)” And, to be precise, it needs to be pointed out that absolute centralization, i.e. absolute “individuality”, is a limit that can be approached but can never be really reached in biological field (Bertalanffy 1968, p.73). In addition, in this way of forming systems, systems are “frequently structured in a way so that their individual members again are systems of the next lower level... Such superposition of systems is called hierarchical order. For its individual levels, again the aspects of wholeness and summativity, progressive mechanization, centralization, finality, etc., apply. Such hierarchical structure and combination into systems of even higher order, is characteristic... of fundamental importance especially in biology, psychology and sociology. (Bertalanffy 1968, p.74)”

Bertalanffy also discusses finality. After arguing against “finality indicates vitalism”, he points out that “there is true finality or purposiveness, meaning that the actual behavior is determined by the foresight of the goal... It presupposes that the future goal is already present in thought, and directs the present action. True purposiveness is characteristic of human behavior, and it is connected with the evolution of the symbolism of language and concepts. (Bertalanffy 1968, p.79)”

Next to the above concepts, Bertalanffy discusses isomorphism in science. As these concepts are general, i.e. they apply to many fields of science, it is possible to cross-apply them. However, this cross-application must be very carefully made, because “analogies are scientifically worthless (Bertalanffy 1968, p.85)”. Bertalanffy points

<sup>10</sup> The term “biocoenosis” is only used here once in this thesis as a part of the citation of Bertalanffy’s original writing. However, as this term is rarely used today, another term, “biological community”, is used in this thesis instead of “biocoenosis”.

out that “homology, in contrast, often present valuable models... General System Theory can serve as a regulatory device to distinguish analogies and homologies, meaningless similarities and meaningful transfer of models. This function particularly applies to sciences which... cannot be fitted in the framework of physics and chemistry... (Bertalanffy 1968, p.85)” And, sociology is obviously such kind of a science.

### 2.2.3.3 Specification of Levels

As mentioned above, there is a hierarchical order of systems. Bertalanffy summarizes the hierarchies of systems as follows (Bertalanffy 1968, pp.28-29):

An Informal Survey of Main Levels in the Hierarchy of Systems. Partly in pursuance in Boulding, 1956		
LEVEL	DESCRIPTION AND EXAMPLES	THEORY AND MODELS
Static structures	Atoms, molecules, crystals, biological structures from the electron-microscopic to the macroscopic level.	E.g. structural formulas of chemistry; crystallography; anatomical descriptions.
Clock works	Clocks, conventional machines in general, solar systems.	Conventional physics such as laws of mechanics (Newtonian and Einsteinian) and others.
Control mechanisms	Thermostat, servo-mechanisms, homeostatic mechanism in organisms.	Cybernetics; feedback and information theory.
Open systems	Flame, cells and organisms in general.	a) Expansion of physical theory to systems maintaining themselves in flow of matter (metabolism). b) Information storage in genetic code (DNA).
Lower organisms	“plant-like” organisms: increasing differentiation of system (so-called “division of labor” in the organism); distinction of reproduction and functional individual (“germ track and soma”).	Theory and models almost lacking.
Animals	Increasing importance of traffic in information (evolution of receptors, nervous systems); learning; beginnings of consciousness.	Beginning in automata theory (S-R relations), feedback (regulatory phenomena), autonomous behavior (relaxation oscillations), etc.
Man	Symbolism; past and future, self and world, self-awareness, etc., as consequences; communication by language, etc.	Incipient theory of symbolism.
Socio-cultural systems	Populations of organisms (humans included); symbol-determined communities (cultures) in man only.	Statistical and possibility dynamic laws in population dynamics, sociology, economics, possibly history. Beginnings of a theory of cultural systems.
Symbolic systems	Language, logic, mathematics, sciences, arts, morals, etc.	Algorithms of symbols (e.g. mathematics, grammar); “rules of the game” such as in visual arts, music, etc.

Table 2.2.3-1. An informal survey of main levels in the hierarchy of systems

This survey is only “impressionistic and intuitive with no claim for logical rigor. Higher levels presuppose lower ones; but the relation of levels requires clarification in each case. In this sense, the survey suggests both the limits of reductionism and the gaps in actual knowledge. (Bertalanffy 1968, p.29)”

As the levels are classified, Bertalanffy writes later: “a unitary conception of the world may be based, not upon the possibility futile and certainly farfetched hope finally to reduce all levels of reality to the level of physics, but rather on the isomorphy of laws in different fields... Speaking in ‘material’ language, it means that the world, i.e. the total of observable events, shows structural uniformities, manifesting themselves by isomorphic traces of order in the different levels or realms... We come, then, to a conception which in contrast to reductionism, we may call perspectivism... The world is, as Aldous Huxley once put it, like a Neapolitan ice cream cake where the levels—the physical, the biological, the social and the moral universe—represent the chocolate, strawberry, and vanilla layers. We cannot reduce strawberry to chocolate—the most we can say is that possibly in the last resort, all is vanilla, all mind or spirit. The unifying principle is that we find organization at all levels... (Bertalanffy 1968, pp.48-49)”

We are getting near to the end of Bertalanffy’s theory. Last paragraph looks like his summative argument against reductionism and also a presentation of his understanding and explanation of the world. However, even after all these arguments, there still may exist an impetus of reducing everything to the very basic particles. Perhaps the reason is that people are aware that there is a possibility of doing so, and our continuously developing technologies are providing the support for this reduction, the search for the very basic particles. Therefore, there is always a hope of finally explaining the world based upon reduction, because it may well happen in the next time of reducing.

Bertalanffy’s attitude is clear: “we cannot reduce strawberry to chocolate”. On different levels, there are different kinds of organizations and different laws. The relations between different levels in each case should be individually suggested. In some cases, the hints of such relations can be found, while in some other cases not. For the latter ones, it is still possible to work on them even if the relations are missing. Observations and summarizations are enough to build up empirical studies. This means to realize the limits of our capacity and to turn to a more practical way of thinking and doing. This also means not to pin our hopes all on reductionism, which is absolute but narrow.

However, acknowledging the limits of our capacity precisely sets a target for mechanistic conception and reductionism to attack. These conceptions believe in the universe’s absolute objectivity and a theoretical continuity on all levels of entities (although many findings in quantum theory have largely disproved this continuity). They also believe in the future achievement of dealing with huge amount of information: Laplace’s demon<sup>11</sup> will come true and the whole universe can be known. Meanwhile, recursion is one of their major theoretical weapons to spread the supposed “ultimate law” to all levels of the universe.

The debate between the two lines of thoughts can go very deep onto the metaphysical level: materialism (corresponding to the mechanistic conception and reductionism) or not. This debate may never be concluded, and it is not the purpose of this thesis to join this debate. Any theory may have its limitation and it might only be

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<sup>11</sup> This is a famous metaphor in determinism. Suppose a super intelligence knows the precise location and momentum of every atom in the universe, then their past and future values for any given time are entailed, as they can be calculated from the laws of classical mechanics:

*“We ought then to regard the present state of the universe as the effect of its anterior state and as the cause of the one which is to follow. Given for one instant an intelligence which could comprehend all the forces by which nature is animated and the respective situation of the beings who compose it—an intelligence sufficiently vast to submit these data to analysis—it would embrace in the same formula the movements of the greatest bodies of the universe and those of the lightest atom; for it, nothing would be uncertain and the future, as the past, would be present to its eyes.”*

*(Laplace 1902, p.4)*

able to explain one aspect of the reality. Then, what all we can do is, maybe, to bear this limitation and to exert the theory's potential as much as we can.

Now it is time to summarize Bertalanffy's theory. His organismic conception provides an essential help in understanding organisms. He clarifies the limitations of reductionism, and builds up a better general understanding of systems. He also gives mathematical descriptions on the basic concepts of systems such as wholeness, growth, competition, etc., to give these concepts a logical basis. The General System Theory he proposes provides a framework for transferring knowledge among different fields, and he also clarifies the conditions for doing this. This kind of transfer of knowledge can much benefit the study on cities.

However, there are also certain problems in his theory. Firstly, as the system theory he proposes is "general", there is no more elaboration on cities. He does discuss something on the society, but such discussions are limited to some basic understandings and inspirations. It is obvious that more works need to be done along this way. Secondly, Bertalanffy's systems are based on observations and summarizations. Together, he tries to give conclusive mathematical reasoning to explain systems of high degree of complexity. His mathematical reasoning looks complex already, but they are still much simplified compared to the reality. Whether this kind of mathematical work really has the potential to adequately describe the complexities of systems in the future is still open to doubt. Thirdly, with regard to no matter the attitude of thinking or to the practical means, Bertalanffy's systems approach is a top-down one, i.e. the consideration of how the basic units are interacting with each other is missing. This should be due to the paradigm of his theories in which such kind of consideration is not indispensable, as it will not influence the observations and summarizations of facts because the facts are always objectively existent. However, a bottom-up approach will make its own contribution, and such an approach can be a supplement of the theoretical framework of this thesis. In the next chapter, I will introduce the Complex Adaptive Systems by Holland, which represents theories in the bottom-up line.

## 2.2.4 Holland's Complex Adaptive Systems

Bertalanffy's key concerns are, firstly, "systems or not", and, secondly, "what kinds of systems", for example, organisms. He briefly mentions the complexity of systems, but gives no further discussions. If complexity is the overall summarization of all characteristics of systems, then, as my personal understanding, Bertalanffy discussed all those characteristics but did not elaborate on the final summarization. He will sometimes use the word "complexity" in his works, but only as a descriptive use. As to how complexity is generated, he did not give a clear explanation. Maybe he did not have time to go deeper into the matter, or maybe such a work is not so much needed in his whole framework. But anyway, "how the complexities of systems are generated" is a very important question for the study of systems. John. H. Holland goes deep into relevant fields, and his work can largely answer this question.

In this chapter, I will review Holland's *<Hidden Order: How Adaptation Builds Complexity>* (1995). As the name suggests, Holland holds that it is adaptation that generates complexity. Therefore, he names this kind of systems "Complex Adaptive Systems (CAS)". To be more precise, "adaptive" means the "agents" in lower hierarchies will adapt to their environment, and "complex" means that all the adapting agents, together, form a system on a higher hierarchy which is characterized by complexity. Going all through Holland's work (1995), it can be observed that Holland's CAS, if using Bertalanffy's terms, is more like "biological community (biocoenosis)". Given the fact that Bertalanffy's main concern is organisms and he did not provide much discussion on biological communities, and as will be argued in Chapter 2.3.1 that a city is a complex of biological community and single organism, Holland's work therefore builds up another half of the theoretical foundation of this thesis.

Holland's 1995 work is largely a handbook on how to build up CAS, and it includes many details. Introducing all of them will take too much space, and even that we are still far away from building a proper model for cities. Therefore, although these details are indispensable in practice, they will not be introduced much in this thesis. I will only introduce those of fundamental importance in understanding the society and cities. The important thing is to have a better understanding of the mechanism of the agents' interactions, and this understanding can be useful to urban planning. A holistic design or a thorough control of a system is not likely to be reached. However, once a better understanding of the interactions among agents and their bottom-up mechanism of growth is reached, we can preserve and promote this mechanism, which is at least much better than otherwise destroying it. And, in fact, this is very likely to lead to some good results for the whole system.

There are two basic concepts to be introduced first. The first one is "agent". "CAS are, without exception, made up of large numbers of active elements that... are diverse in both form and capability. (Holland 1995, p.6)" This "active elements" are agents. The second one is "adaptation". In order to understand adaptation, it is necessary to understand the way of interactions of large amount of agents. And, in order to understand these interactions, "it is useful to think of an agent's behavior as determined by a collection of rules (Holland 1995, p.7)", typically stimulus-response rules, i.e. IF stimulus "S" occurs, THEN give response "R". Holland continues to write, "to define the set of stimulus-response rules possible for a given agent, we must describe the stimuli that agent can receive and the responses it can give. (Holland 1995, p.7)" Then, after the rules are specified, "by looking at these rules acting in sequence, we arrive at the behaviors open to the agent. It is at this point that learning or adaptation enters. (Holland 1995, p.8)" Holland holds that "adaptation is the *sine qua non* of CAS... We will view CAS as systems composed of interacting agents described in terms of rules. These agents adapt by changing their rules as experience accumulates... A portion of any agent's efforts at adaptation is spent adapting to other adaptive agents. This one feature is a major source of the complex temporal patterns that CAS generate. (Holland 1995, pp.8-10)"

Next, Holland describes seven general basics for all CAS, including four properties and three mechanisms. The reason why the seven points are basic is that "all the other candidates (characteristics) can be derived from appropriate combinations of these seven. (Holland 1995, p.10)"

The first basic is "aggregation", a property. "Aggregation enters into the study of CAS in two senses. The first refers to a standard way of simplifying complex systems" and the second sense is "more a matter of what CAS do, rather than how we model them. It concerns the emergence of complex large-scale behaviors from the aggregate interactions of less complex agents". There are many examples in many fields for this, and one of them is the coherence and persistence of a large city. And, "aggregates so formed can in turn act as agents at higher level—meta-agents... Meta-agents can, of course, aggregate (second sense) in turn to yield meta-meta-agents. When this process is repeated several times, we get the hierarchical organization so typical of CAS (Holland 1995, pp.10-12)." Here we can see the correspondence of Holland's work to Bertalanffy's "hierarchical order" (Bertalanffy 1968, p.74). Holland (1995, p.12) holds that studies on the mechanism of aggregation, such as what kind of "boundaries" demarcate these adaptive aggregates, how the interactions are directed and coordinated, how the interactions generate behaviors that transcend the behaviors of the component agents, etc., are the key work to resolve the mysteries in CAS.

The second basic is "tagging", a mechanism. Tagging is a pervasive mechanism for aggregation and boundary formation in CAS. For a simple example, it can be a flag to rally members of an army; for a sophisticated example, it can be cell adhesion molecules (Edelman, cited in Holland 1995). Tags can "facilitate selective interaction. They allow agents to select among agents or objects that would otherwise be indistinguishable. Well-established tag-based interactions provide a sound basis for filtering, specialization, and cooperation. (Holland 1995, pp.14-15)" The range of tags' application is wide from CAS to organisms. The concept of tagging actually means a

fundamental prerequisite of the interactions between agents.

Holland (1995, p.15) also holds that tags are the mechanism behind hierarchical organization which is very common in CAS. This assertion needs to be further clarified, because if the taken agents have only “lateral” tags (or interfaces), it will be difficult to understand why they will generate hierarchies which are “vertical”, as no matter how they interact through the tags, they are only developing horizontally, but not vertically. Therefore, it should be considered like this: agents can have several tags, some lateral and some vertical. The lateral tags are to correspond to the tags of other agents on the same level, and this will not generate hierarchies; the vertical tags are to correspond to the tags of agents on other levels, and this is how hierarchies are generated. Multi-tag is a basic characteristic of agents, and this implies the broad connectivity and complexity of systems.

The third basic is “nonlinearity”, a property. For this property, Bertalanffy (1968) had given much discussion mathematically. Holland discusses this issue here again. He firstly points out that the linearity assumption does not apply to CAS at all. To study CAS with linearity techniques is “much like trying to play chess by collecting statistics on the way pieces move in the game. (Holland 1995, p.16)” Then, taking predator-prey interaction and collision of billiard balls as examples, Holland (1995, pp.16-23) explains step by step how nonlinearity is introduced into CAS. Summarily speaking, there are two reasons for nonlinearity: (1) the various ways of interaction among agents, and (2) the subtle differences among those agents that seem alike. If nonlinearity is adequately taken into account in a CAS, it will not be a problem, but just be a feature. But in fact, a really “adequate” consideration requires a thorough specification, even onto every individual, which is obviously too difficult. For practicality purpose, aggregation (in the first sense), as mentioned before in this chapter, is often used to group the similar agents in order to simplify the system. This method tends to be linear, and it strays away from the reality of nonlinearity, but we have to accept this compromise. This is the key contradiction in the problem of nonlinearity, and it seems that we can only count on our technological capacity which is gradually growing to solve this problem more.

The fourth basic is “flows”, a property. We can recall what Bertalanffy has said that flows are a basic characteristic of organisms. Here in CAS, flows also play an important role. Holland elaborates on two effects of flows: multiplier effect and recycling effect. Multiplier effect means that if additional resources are injected at some nodes, typically these resources are passed from node to node, possibly being transformed along the way, and produces a chain of changes. This process of passing attenuates until it ends. The cumulative amount of resource at the end will be several times as much as the beginning. This cumulative amount is not the amount of any moment, but is the amount ever appeared in all places through the whole process; it indicates how extensively, and how intensively, the flows benefit the system. This is like the result of shooting pictures at different moments on the same piece of negative. Recycling effect means that, with the same raw input, if recycled, more resource will be produced at each node. The overall effect in a network with many cycles can be striking (Holland 1995, pp.24-26). What needs to be pointed out is that both of the two effects tend to happen at where different agents aggregate, because the aggregation of same kind of agents tends to reach a balance, which will normally weaken the flows.

The fifth basic is “diversity”, a property. From rain forests to the human society, diversity goes for each CAS in turn (Holland 1995, p.27). This is neither accidental nor random. Holland (1995, p.27) points out that “the persistence of any individual agent... depends on the context provided by the other agents. Roughly, each kind of agent fills a niche that is defined by the interactions centering on the agent. If we remove one kind of agent from the system, creating a ‘hole’, the system typically responds with a cascade of adaptations resulting in a new agent that ‘fills the hole.’” The generation of diversity can be also because of “the spread of an agent opens a new niche—opportunities for new interactions—that can be exploited by modifications of other agents. (Holland 1995, p.28)” And, “the diversity observed in CAS is the product of progressive adaptations. Each new adaptation

opens the possibility for further interactions and new niches. (Holland 1995, p.29)" The new niches will also, conversely, promote the generation of new agents; this evolution is endless. All these above are the mechanism which generates diversity. Adding some considerations about nonlinearity, Holland (1995, p.31) reaches the conclusion that "the recycling of resources by the aggregate behavior of a diverse array of agents is much more than the sum of the individual actions." Therefore, aggregation of different kinds of agents is much more effective than that of the same kind of agents in pushing the evolution of agents, i.e. of the whole system.

The sixth basic is "internal models", a mechanism. Summarily, Holland holds that "internal" means "inside the agent", and "internal model" refers to the mechanism for anticipation. Agents can distill experience into internal models. Even a simple bacterium can move in the direction of a chemical gradient, implicitly predicting that food lies in that direction. The internal models of animals and human are much more sophisticated. There are two kinds of internal models: tacit and overt. "A tacit internal model simply prescribes a current action, under an implicit prediction of some desired future state"; it is similar with stimuli-response, but is normally slightly more active. An overt internal model is much more explicit; it can also be called "lookahead", like playing chess. Obviously, variants of the model are subject to selection and progressive adaptation. At last, a requirement of such models was clarified: meteorites and other inanimate structures are not included. (Holland 1995, pp.31-34)

The seventh basic is "building blocks", a mechanism. It means to decompose a complex scene into parts, and these parts can then be used and reused in a great variety of combinations, like a child's set of building blocks. As the variety of combinations is huge, it is capable to deal with various different environments. (Holland 1995, pp.35-36)

Holland has noticed the hierarchical organizations in the process of decomposition (which also appeared in Chapter 2.2.3 of this thesis). He lists hierarchies of quark/ nucleon/ atom/ molecule/ organelle/ cell/ ... (Holland 1995, p.36). This is similar with Bertalanffy's "hierarchical order" (Bertalanffy 1968, pp.28-29). However, Holland's view of the relations between different levels is different from Bertalanffy's. Holland (1995, p.36) holds that "we gain a significant advantage when we can reduce the building blocks at one level to interactions and combinations of building blocks at a lower level: the laws at the higher level derive from the laws of the lower-level building blocks... It does add a tremendous interlocking strength to the scientific structure." Compared with Bertalanffy's level-by-level observations which make the role of relations between different levels less important, Holland makes more effort on investigating the relations between levels. There is actually no essential difference between the understanding of hierarchical organizations of Holland and that of Bertalanffy, and the difference between their attitudes and approaches are largely because of different technological conditions they were equipped with. In Holland's time, the big progress of computerization and simulation makes it possible to have more thorough researches on how meta-agents are formed by the interactions of agents on lower levels. This approach is actually reductionism; it was opposed by Bertalanffy, but Holland, with better weapons, picked it up again, and discussions about the advantages and disadvantages of reductionism have already been provided in Chapter 2.2.3 of this thesis.

After the above seven basics are introduced, Holland discusses how to build up CAS models in practice. He goes deep into more details about CAS such as the properties of models and rules and syntaxes in model building. These will be very inspiring in building models for the society and cities, but as they are much beyond the scope of this thesis, I will not go deep into them. Summarily speaking, all these details are with the same purpose: to better support the seven basics above.

A keyword all through the seven basics is "interaction". Obviously, in different CAS, ways of interactions have a great variety, as the combinations of the basics and the details are huge. But one rule looks constant: "interactions" should be facilitated, but not restricted. The more frequent and sophisticated the interactions are,

the more likely aggregations (of same and different kinds of agents), adhesions, stratifications, and large-scale emergence will happen, and these features are largely indicating the evolution of the whole systems.

A lot of observations have been made on the phenomena in CAS, and Holland's work is to investigate the mechanisms behind them. How much achievement had he gained? Holland (1995, p.161) writes as follows in the last chapter: "The destination—general principles... are still on the horizon... At present we can only see fragments of these principles, and the focus shifts from time to time..." This means that only a small passage of the whole voyage is finished. The future efforts should, largely as well, follow the way of investigating the mechanisms.

In the process of investigating mechanisms, one question will naturally arise: if mechanisms are like lines to connect different agents in different ways, then, what is the essence of the individual agents, at the ends of these lines, that looks like "mass points" in the big scene? It might be too early to ask such a question at this stage, and what we have already known seems to be quite inadequate to give the answer. However, this question is so fundamental that even just a little more insight on it will inspire much on the related efforts. Therefore, it is necessary to discuss it.

Bertalanffy, in his 1952 work (Chapter6), wrote something about this. He holds that as people are making more progresses in Physics, they are also gradually realizing their limit. The physicists have realized that their duty is to describe the phenomena within a system of formal relationships; they no longer expect to catch the core of entities. Contrary to the earlier physicists who thought they had found the "essence of all entities" in the tiny and hard particles, modern physics is holding a different attitude: materials look possible to be finally decomposed into some courses of vibration, but their final essence is still unknown. Bertalanffy introduces this understanding into biology (organisms), and points out that we can, as well, no longer expect the biologists to answer "what is the very essence of life". They can only better describe the phenomena in the organisms or state the laws and principles that apply to the organisms.

Similarly, this understanding can be introduced into CAS. We can observe the phenomenon of CAS and try to investigate the mechanisms behind, but we may never catch the essence of the basic agents. Particularly, in the CAS of society, the agents are ourselves. Can we understand ourselves? This will be an interesting debate, quite philosophical, likely to last long, and might never be fully answered. Therefore, the idea of putting aside the enquiry of "essence" and focusing more on the phenomena and mechanisms applies to both organisms and CAS, two kinds of typical systems. And, this idea actually applies to nearly all sciences—it is a paradigm of thinking: after realizing the limit of our capability, we might achieve more in the fields that we are able to deal with.

## **2.2.5 Summary and Reflection on the Complexity of Systems**

The above are all the contents I will borrow from systems theories. Here I would like to recapitulate them for the convenience for later discussions.

- Systems are organizations made up of components that are widely and complexly interacting with each other.
- Systems have certain degree of centralization on all levels. Absolute centralization and absolute decentralization are two extremes that exist only in theory: the former is almost impossible to reach, while the latter makes a system disintegrate, no longer being a system. Normally a system is at a certain status in between the two extremes.
- Of all the statuses, two are typical: organisms and CAS. Of the two, organisms are more centralized, while

CAS are more decentralized.

- Both organisms and CAS are abstract conceptions, and they can refer to various objects.

Then, there are following essentials for organisms:

- 1) They are whole systems, and should not be merely explained by the approach of analysis, i.e. mainly accumulation and reduction.
- 2) They are essentially dynamic flows, but not merely static and mechanic structures.
- 3) They are active systems, but are not merely passive, reactive systems.

CAS are systems described in terms of rules, and composed of various interacting “agents”. These agents adapt to their external environments by accumulating experiences and consequently changing their rules. They have the following 7 basics:

- 1) Aggregation (a property)
- 2) Tagging (a mechanism)
- 3) Nonlinearity (a property)
- 4) Flows (a property)
- 5) Diversity (a property)
- 6) Internal models (a mechanism)
- 7) Building blocks (a mechanism)

The following are some facts that are generally in accordance with most systems, covering both organisms and CAS:

- The systems approach has already become a paradigm, and is being applied to various subjects.
- Concepts in systems theories such as wholeness, growth, competition, sum, mechanization, centralization, finality, etc., could all be described and analyzed mathematically. This means that these concepts are all “legal” concepts in science.
- There are hierarchical orders for systems, i.e. levels are being built up, higher and higher, and the above-mentioned concepts of systems apply to various levels.
- General System Theory builds up a bridge for the transfer of knowledge among different aspects of sciences. Subjects exceeding the traditional physical-chemical fields, e.g. sociology, can be greatly benefited by this theory.

The following are some discussions about the complexity of systems:

- Normally, the more advanced a system is, the more complex it is. Complexity refers more to the sophistication of the interactions among the components, but not only a big amount of components. For example, no matter how large the quantity of a pile of unicellular organisms is, their aggregation has very low complexity, as they have little interactions with each other.
- Starting from that simple aggregation, if they develop further, both the individuals and their interactions may evolve. CAS is gradually formed, and the complexity of the whole system increases.
- CAS may emerge a tendency of progressive centralization, which is often linked together with progressive mechanization. In this case, a CAS is gradually getting characteristics of organisms.
- Bertalanffy holds that this progressive mechanization is an increase of complexity. (However, Bertalanffy did not give a clear definition on “complexity”, and he did not argue on why complexity is increased in this case.)

Then, we start to think more concrete aspects on the issue of complexity:

- Even for a highly advanced system, its static structure is not very complex. It normally is within the range of our capacity of observation. For example, although human body is extremely complex, its components and

static structure is quite clear now under microscope and scalpel.

- However, the complexity of a highly advanced system lies essentially in the process. For both organisms and CAS, “process” refers to dynamic flows. This has reached the margin of human knowledge. Taking human body as example again, its internal biological processes are still far away to be completely observed and understood (Kennedy and Norman, 2005).
- Although many systems are with so high complexities which are beyond our present comprehension, they should not be viewed as works of entelechy; otherwise we are actually giving up the pursuit of knowledge. Also, it is obvious that this kind of systems is not created by human, as they are too much beyond human’s capacity of design.
- Starting from CAS which is less centralized, in order to facilitate the development of a CAS, it seems necessary to facilitate the development of the 7 basics of CAS described by Holland.
- In the process of a CAS evolving toward organism (normally with higher complexity), the essential driving force of this process is still unknown, but at least there are two surmises: (1) it seems necessary to preserve the basics of CAS, and it is very likely that it is right the development of the basics that pushes the development of the whole system; (2) simply simulating the static structure of an advanced system, no matter an organism or a CAS, may not ensure the newly produced copy successful, as dynamic flows cannot be easily copied. An important fact is that we the humans, although with so much progress in modern sciences, could still not even produce a simplest life; we are only able to nurture lives.

### 2.3 Relating Systems Theory to the Cities and the Society

So far we have had a long journey on abstract systems, and very often life science is taken to support the arguments. Now it is the time to discuss our main concern, cities. In this chapter, abstract characteristics of systems will be applied to cities: the wholeness of cities, cities as open systems, cities as complex adaptive systems, and some other important points of cities will be discussed. We have chosen the road of systems approach, and this means we have broken with the orthodox planning theories. The aim of this chapter is to reach a better understanding of cities, and to see what new principles could be reached to take the place of the corresponding part of the orthodox planning theories.

First things first, there are two key questions: are cities systems? If they are, what kind of systems are they? Looking at Table 2.2.3-1, cities are not categorized into any level. But let us read the following writing first:

*“The city, in its complete sense, then, is a geographic plexus, an economic organization, an institutional process, a theater of social action, and an aesthetic symbol of collective unity... It is in the city, the city as theater, that man’s purposive activities are focused... into more significant culminations...”*

*(Mumford, 1937)*

The above paragraph implies that the concept of “city” and “society” are somehow interchangeable, as “city is... a theater of social action”. It is reasonable that when we are trying to understand cities, we need to understand their correspondent societies. Therefore, in this thesis, “city” and “society” are very often put together for discussion. Then, looking at Table 2.2.3-1 again, “socio-cultural systems” is located at a very high level, and this indicates that, firstly, cities are systems and, secondly, the urban systems are on a high level.

The society is a conceptual system (Bertalanffy 1968, Foreword), and city, the theater of social action, is the

physical embodiment of that conceptual system. Therefore, on its essence, city is also a conceptual system. A city mainly includes two parts: (1) its physical part, i.e. the spatial existence, and (2) its social part, i.e. all the social actions, in the broadest sense, of all the people in a city. Its physical part, as Mumford writes (1937), “may deflate this drama or make it frustrate; or it may, through the deliberate efforts of art, politics, and education, make the drama more richly significant, as a stage-set, well-designed, intensifies and underlines the gestures of the actors and the action of the play.” What Mumford emphasizes is that the theater is “for the drama”. The theater is static on itself, while the drama is alive. Only when the drama goes on (and it normally does), the theater makes sense. The capacity of the theater’s stage should match the requirement of the drama. If the capacity is, to a certain extent, higher than is required, it would be OK as this gives space for further development of the drama. However, if the capacity is lower than is required, then the drama will be “deflated”. To translate the metaphor, what I mean here by “capacity” is a city’s spatial complexity. This spatial complexity of a city should at least match the complexity of the city’s social actions. If not, the potential of the city will be repressed.

### 2.3.1 The Wholeness of Cities

Now it can be seen that it is important to understand cities from the social perspective. For a long time, we lack a proper understanding of cities due to the lack of understanding of the society. However, this is not because of the failure of transferring the result of study on society to the urban field, but is because that the study on society on its own right is still very basic. Bertalanffy points out that “we know and control physical forces only too well, biological forces tolerably well, and social forces not at all. (Bertalanffy 1968, p.52)” So, should we put more effort for a stronger control on the society? That might bring about some pay back, if we believe in “efforts always pay back”. However, that could also be the road of no return to Leviathan<sup>12</sup>. If the direction of effort is wrong, the result could be devastation, and even earlier. Therefore, right direction is a prerequisite. This is like a drowning man in the sea. He of course needs to stroke hard to survive, but he should first make sure his head is upward. If otherwise downward, no matter how hard he strokes, he will only sink deeper.

With regard to “how to find the right direction”, it obviously needs elaborated discussion, but one thing is sure: it cannot be found simply by a strengthened control. We first need to have more understanding of cities, more specifically what kind of systems cities are. And also, under the supposition that city is a theater of social action, we put the society instead of cities into the discussion here.

From individuals’ perspective and looking at their daily lives, if we temporarily put aside their working, the urban society is indeed like a biological community, e.g. a forest. Every individual needs to have a place to live, to buy some daily stuff, to go for leisure, and to do many other kinds of common, daily things, just like the animals in a forest will similarly need to search for food and to have rest every day. People do not need centralization to do these things. No matter in the center or in the edge of the community, people are doing the same on these things. This is a duplication of simple, individual behaviors in a broad extent.

However, if we take people’s working back into account, things are different. On this issue, we will inevitably come to the division of labor which is a very essence of human society. It is commonly accepted that division of labor makes each individual more efficient, and the total wealth of the whole society therefore increases. Think in another way, people finish unit amount of work faster, and this means people will have more free time for new

<sup>12</sup> Leviathan is a book written by Thomas Hobbes (1588–1679) and published in 1651. Its name derives from the biblical Leviathan. The work concerns the structure of society and legitimate government, and is regarded as one of the earliest and most influential examples of social contract theory. Written during the English Civil War (1642–1651), Leviathan argues for a social contract and rule by an absolute sovereign. Hobbes wrote that civil war and situations identified with a state of nature and the famous motto *Bellum omnium contra omnes* (“the war of all against all”) could only be averted by strong central government (Wikipedia 2013, Leviathan (book)). Leviathan is somehow reasonable on itself, but its derivatives can go as far as totalitarianism.

creations and association, which push the society evolves further. And division of labor precisely corresponds with Bertalanffy's "progressive mechanization", which is described by Bertalanffy as an important characteristic of organisms. So, here we see the organism side of the society.

By now we can see that the urban social systems have characteristics of both biological communities and organisms. As a simple understanding, a social system can be viewed as a complex of a biological community and an organism. More precisely saying, it is a "decentralized system" on its move to a "centralized system". In other words, it is "many individuals" on their move to "one individual". Then, considering the relation between cities and the society, this may imply that a city can be also viewed as "individuals moving toward one individual" or, as a simple understanding, a complex of biological community (which is, a CAS) and organism. From GST's perspective, this understanding of cities and the society is quite accurate. But if anyone asserts, according to GST, that the more a society is centralized (or progressively mechanized), the more advanced it is, he must be reminded that there is a catch in this statement: it is the way to Leviathan.

It has to be admitted that "the tendency to study systems as an entity rather than as a conglomeration of parts is consistent with the tendency in contemporary science no longer to isolate phenomena in narrowly confined contexts, but rather to open interactions for examination and to examine larger and larger slices of nature (Ackoff, cited in Bertalanffy 1968, p.9)" is definitely an advance. It also has to be admitted that the society has its organism's side, which means it should be at least partly in accordance with the law of progressive mechanization. Then, the extremes may even enthusiastically push this kind of progressive mechanization under the flag of "pushing the evolution of human society". However, there are two questions to dampen their enthusiasm: (1) whether people can and should be completely mechanized, and (2) even if this mechanization has its positive side, how should they be properly achieved.

For the first question, Bertalanffy (1968, p.10) describes a scene that "man in the Big System is to be—and to a large extent has become—a moron, button-pusher or learned idiot, that is, highly trained in some narrow specialization but otherwise a mere part of the machine". Later, he gives his clear attitude (Bertalanffy 1968, pp.52-53): "Scientific control of society is no highway to Utopia... We may, however, conceive of a scientific understanding of human society and its laws in a somewhat different and more modest way. Such knowledge can teach us not only what human behavior and society have in common with other organizations, but also what is their uniqueness... Man is not only a political anima; he is, before and above all, an individual... Human society... is based upon the achievements of the individual and is doomed if the individual is made a cog in the social machine."

Bertalanffy's attitude is clear and strong. However, what he states above is more like a declaration; as an argument, it is still basic. I would like to add something to make this argument more complete. It is indeed a progress to view the human society under the paradigm of systems theory, but this will inevitably incur a danger of degrading the value of human individuals. Actually this danger had already been realized by Bertalanffy very early in his 1952 work, as was referred to in Chapter 2.2.2 of this thesis. In his 1968 work, Bertalanffy just emphasizes this again. From systems theory's view, hierarchical levels of individuals to whole, and wholes to a higher whole, and furthermore, seem to be never ending. However, on human's level, it must be considered specially. We must do like this because, subjectively speaking, we are considering ourselves and, objectively speaking, because only on human's level do the entities present such notable free minds, activeness, creativity, and many other unique and amazing qualities. All these have decided that an individual people should not be viewed like a particle or a cell which absolutely subordinates to a higher whole. If so, we are digging our own graves.

However, this as well does not mean that human should be scattered. The animal society is much more scattered,

but the cost is their low level of sociality and much poorer achievement compared with human. The achievement of human is indeed to a large extent due to our sociality or, in another term, division of labor or, in still another term, progressive mechanization. We were so fortunate because this progressive mechanization made us stand out from the animals and brought about such a great achievement to us. We were once unfortunate because we were shadowed by the highest cost we could possibly pay for progressive mechanization—totalitarianism. But we are so fortunate again that this totalitarian monster seems to be being defeated, although slowly and difficultly, leaving only the history of 20<sup>th</sup> century and the book <1984> as forever alarms for us today and for our future generations.

As have been mentioned, when a person becomes a component that better and better fits the whole society, the society as a system may evolve. But a prerequisite is that he chooses his role, during both training and working, by his free will and therefore enjoys it. The bigger achievement for all the human beings in total is the propulsion for progressively mechanization, while the consciousness of individuals' resistance due to the violation of their will is the resistance against progressively mechanization. Here, a contradiction is reached. But this contradiction does not mean a dead end; on the contrary it means we are touching the very essence of the problem, as we are getting near to the very basic concept of philosophy from Heraclitus' time, the unity of opposites.

As opposites are identified, the next step is to unify them. This will also answer the aforementioned question of "how to properly achieve progressive mechanization". It makes no sense to say one should give way to the other—this is not the way to unify opposites. What are needed are solutions that satisfy both sides. When a society is gradually mechanized, or, even if its degree of mechanization does not increase but its structure changes, there surely will be some people that are no longer needed by the society, just like abandoned screws from a machine. If the society is a meta-organism, then it is totally OK that these people are just left abandoned, just like the cut-off hair. However, what makes human society different is that these people will be given compensations. As the society evolved, its total achievement, say wealth, will be bigger than before. Therefore, even if the abandoned people are paid as same as before, there is still extra wealth gained than before. This kind of compensation, in other words redistribution of wealth, is a possible way to unify opposites. But of course, finding the right and fair channel to redistribute wealth is not easy, and this is precisely the core topic of modern politics and is what needs more effort. What is more, unlike a mechanized cell that could not change into another kind, people as an active entity with amazing potential and willpower, as long as he is not too old, will always be able to learn new things. This means that if he is no longer needed somewhere, he can be useful for another position after being trained for new skills. This mode is even better than the compensation mode, as the attitude and approach is more positive. These have shown that there are enough chances to unify opposites. And, once the opposites are unified, we could say that we are achieving "wholes" in the real sense.

Now we can transfer the above understanding to cities. So far, the wholeness of city is clear: every individual in cities is interacting with the others; this interaction is so broad, that a city must be considered as a whole. In a sense, cities even seem to be evolving into meta-organisms, and their degree of wholeness is becoming greater. However, I do not mean to stress on the wholeness of cities. On the contrary, I think, firstly, there is certain degree of wholeness, and it is dangerous to over integrate cities if the corresponding urban societies have not reached such high degree of wholeness. Secondly, even for the limited wholeness, there are certain ways to achieve it. Radical means, often fast and superficial, may not succeed.

The reason not to over integrate cities, on its essence, is that societies should not be over integrated, given that cities are reflecting the urban societies. What I mean by "integration" is progressively mechanization. When a society is over mechanized, an individual becomes a screw on a machine and his freedom is restricted. Similarly, when a city is over mechanized, the flexibility of its functions is lost. Actually, zoning, a remarkable tool of orthodox planning, is quite like mechanization: during the process, various functional zones are pre-defined,

arranged and well-coordinated, like designing a machine. Eventually, the result of the design—no matter images or model—is, normally, also like a machine. Highly developed mechanization is actually highly developed wholeness: the loss of any part causes defect on the whole, which is obviously unacceptable. Therefore, zoning is a march toward a high degree of wholeness (at least seems to be). For a long time, zoning has been put on a special position in orthodox planning theories. Many plans are just attempts according to inclinations on different values, but in the same way—zoning. Sometimes, they are even just the same zoning plan, but being decorated and advertised in different ways. However, considering the fact that our societies have not reach such a high degree of wholeness (or, we can say that some organizations tried to push this, like the Soviet Union before or North Korea now, but none of them succeeded so far), we can get to a surmise that cities after intense zoning schemes may have been over integrated.

If so, the next task is to find a proper degree of the wholeness of urban spaces, and it should be indicated by the wholeness of urban societies. However, given that our understanding of urban societies and our capacity to describe them are quite limited so far, it is nearly impossible to indicate and to direct the planning of urban spaces in this way. A better way might be to discuss in what way should cities be pushed toward higher wholes, and this is basically the second question mentioned earlier in this chapter.

We need to discuss this along two lines: society and space. Urban society is abstract, and its wholeness depends mainly on the degree of development of the society—including both bottom-up growth of the society and top-down regulation from people; urban space, on the contrary, is very concrete, and is always planned and implemented by people. It is very difficult to make urban space perfectly match the urban society, especially considering our very basic understanding of the urban society which makes it very hard to take it as an indicator. However, as stated above, it is very likely that the pursuit on the wholeness of city in orthodox planning was too much. Man-made plans and regulations always seem to have reasonable targets and clear futures. The clear order and differentiated and coordinated functions seem to have pushed urban systems into a higher degree of development. And, if there is enough human and material resource, enough enthusiasm and confidence, the ideal, developed cities, i.e., in a sense, cities with higher wholeness, can even be immediately reached. Jacobs has commented this way as problematic (cited in this thesis in Chapter2.1) from a sociological angle based on phenomena. Here I would like to provide some explanation by means of systems approach. Wholeness is a measure of the development of a system; it is a feature, but not the essence. Without grasping the essence, working on the feature is pointless and is very easy to lose the essence. To be specific, it is the detachment of urban space and urban society, and this is the main problem of those intensely planned cities.

On an abstract level, the essence of the wholeness of a system is the broad interactions among its internal components. Therefore, the wholeness of a city is essentially the interactions among people, no matter as individuals or as groups, living inside the city. To facilitate this kind of interaction is to naturally facilitate the wholeness of the city. This kind of wholeness makes much more sense than the wholeness on paper. Any plan on paper, even if it will totally kill the social lives in a city, can still look beautiful and like a whole—this is just a very common trick in designs which can be used wickedly.

More specifically, the interactions among people in a city can be classified into two categories: market interaction and non-market interaction. For market interaction, the key is to build up a healthy economy—how much free market, how much central regulation, and how to regulate, etc. This issue is not within the range of this thesis, but as a basic requirement, urban space must meet the need of urban economy, and also it should have flexibility to adapt to future development of urban economy. If the use of urban land can be more marketized, with more freedom and flexibility, and the property rights can be more freely transferred and less interfered, the urban space may be able to respond to the need of urban society more instantly. This is probably a short cut to make urban space and urban society match.

Non-market interaction is, largely, people's social activities, in its broadest sense. To ensure active and healthy social activities, the support by space is necessary. For a long time, in orthodox planning theories, there actually are many considerations for social activities, such as community centers and open spaces. But, as Jacobs (1961) asks, who will use them? In the planned communities, a common and impressive scene is that the gardens are empty, and the community centers are rarely visited. If there is no user, these spaces for social activities are actually non-existent. People do not always use whatever space they are provided. They only use those they like; otherwise they would rather stay at home. What kind of space people would like to use? Jacobs (1961, Chapter 3) has described in very detail: those that are convenient and safe, that are able to protect people's privacy, without involving strangers into one's own life and also without being involved, and that meets other necessary psychological needs of people, which consequently conducts people into self-willing and proper behaviors. All these have touched another independent subject: behavioral science. Of course, this does not mean that urban planners must be experts in behavioral science, but at least, the basic respect on the general principles of people's activities should be ensured. Unfortunately, in reality, there are so many urban planners and architects who either dropped into the creating of grand and beautiful, artistic spaces, or who stick onto their doctrines and statistical data, such as greenery rate and sunshine spacing, and hold them absolutely correct to decide everything, forgetting that they are actually quite limited. They assert that what they propose are for the people, but actually they do not really try to understand people. Now it is time to come down onto the ground, with less imagination and with more respect to what people really need. Going further along this attitude, the traditional streets, with mixed uses, complex and crossing with each other, are tested by the society for a long time. This kind of street corresponds with people's social life, i.e., in higher words, the urban culture. However, orthodox planning theories go largely against this kind of street. Streets that should be viewed as complex entities are detached and restructured—a complete surgery. Some brand-new spaces are provided for people to enjoy, but as I will write about later, the users are so rare, and the way of using them is so monotonous, even odd. The green fields and squares look indeed beautiful—on paper, but lonely—in reality. In no way can I not relate this kind of community to Utopia. Actually, the surgery is not only on the streets, but also on people's life. Where would the anatomized and restructured life finally go? This is indeed a sharp and fundamental question.

To summarize this chapter, cities' wholeness is with no doubt, but it is a big issue how to achieve the wholeness. A top-down, seemingly comprehensive plan may not let a city to have wholeness in the real sense, while a mixed use of land and flexible land policies may essentially facilitate a city to develop into a higher whole in a bottom-up way, as the interactions of people in the city are encouraged. In this way, an urban system evolves into a more advanced level.

### **2.3.2 Cities as Open Systems**

After getting an understanding of cities' wholeness, considering the characteristics of organisms summarized by Bertalanffy (1952), now it is time to discuss whether cities are dynamic or static. In this chapter, we use two concepts that are more general and summative to take the place of "dynamic system" and "static system", which are respectively "open system" and "close system". Therefore, we are actually discussing whether cities are open systems or close systems. As argued before, cities are, at least partly, organisms. Then, together with the viewpoint repeatedly argued by Bertalanffy (1952 and 1968) that organisms are open systems, we have got reasons to say that cities are also open systems. Zhou (2002) has also defined cities as "giant open systems with complexity".

Among the various characteristics of open systems, two of them are noticeable, as they also apply to cities: (1) continuous input of energy is needed for open systems, and (2) dynamic order is the essence of open systems, rather than static structure.

The first understanding defends cities' feature of demanding for energy. Cities have been long blamed for this. But after realizing that this is a basic characteristic for all open systems, this blame should diminish. The inputted energy is not wasted; it is used for generating order. And this order, in a sense, is human society. The social value of this order is much higher, even on a higher hierarchy, than the value of energy required. But of course, this is not to say that cities can consume however much energy. Smarter use of energy is a forever issue for cities.

The second understanding leads us to move our attention from the structure of cities toward the flows in cities. We have discussed that the flows of organisms are more important than their structures, and here I would like to emphasize this point again. In orthodox planning, clear structure is a forever goal, as an ideal, and also as a natural product of the designers' instinct. I am not against this, but I have to say this is not enough. The cities do have static structures, but there is also something beyond—the internal flows, as have been discussed in Chapter 2.2.2. The attention on flows in orthodox planning is obviously not enough. The methodology there is to set areas for different functions first, then to estimate the necessary capacity of streets, and at last to allocate various ranks of streets according to the needs. There are two main problems caused by this method: first, transportation problems, with traffic jam being the most prominent one; second, lacking penetration and extension by the cross-use of people, and as a result lacking the consequently stimulation on economy. The first problem is such an important one in all urban problems, but I have to put it aside, as it is already a whole, complicated subject on its own right. The second problem has been discussed at great length in Jacobs' work, and has been extracted in Chapter 2.1 of this thesis. What called by Jacobs "vitality" and "diversity" are closely related with "flows": the essence of vitality is strong flows of people, and diversity is a precondition of vitality. Therefore, this means that diversity is a precondition for flows. If "flows" can be the point of departure in urban planning, and consequently "diversity" will be justified to support the flows, the resulted cities might be much healthier. Even if, due to certain considerations, static structure is still taken as the point of departure, the later on analysis on human flows can be a helpful, additional test on the result. The "dead corners" of the plan can be identified and then improved.

The second understanding also implies that the development of cities is eternal and is without a foreseeable final status. The common organisms will die anyway, but cities may sustain forever (in this sense, it can also be found that cities are not only organisms). This is indeed an amazing feature of cities. In the short term, cities as open systems are in steady state. In the long term, cities gradually, sometimes even very fast, evolve.

Cities are never close systems, unless they are totally forsaken, like the dead organisms. The forsaken cities will decay soon, and those forsaken buildings and facilities are just like the decaying cells in dead organisms. Although the specific reasons for a city's death might be different from those for an organism's death, the mechanisms are similar: the former loses the maintenance by the people, and the latter loses the ability to absorb energy to maintain the steady state of itself. Dead open systems become close systems, and this is definitely not what we want to get. Actually cities are rarely forsaken, unless under a serious strike like a nuclear leak or an industrial recession. This is to say that cities are rarely degrading to close systems. However, Jacobs has pointed out that the pursuit in orthodox planning theories is an obvious static state and quietness, and these features are just features of close systems. When the static state and quietness are expressed by the architects in an artistic way, they are quite enough to touch people's heart and to persuade people to pay for them. However, the designers might not have realized that the cities they designed are essentially close systems; in other words, they are dead.

### **2.3.3 Some Other Important Characteristics of Urban Systems**

Other than wholeness and openness, there are also some other characteristics of urban systems.

- Bertalanffy holds that organisms are active systems. Considering cities are at least partly organisms, this infers that cities are also active systems. This statement is abstract, and it needs some explanation. “Active” means that a system has an internal driving force and mechanism to push its own development, but not only reflecting the external environments. The essential driving force of cities is the interactions among people, which is internal. The development of cities is essentially the development of urban societies, and societies are mainly driven by internal forces, but not external forces. For instance, the industrial revolution in 19<sup>th</sup> century is an inevitable consequence of the scientific and social development, but not of some big events outside the human society. Of course, external environments like geographical conditions, climate conditions and so on do have a certain influence on urban development, but this influence should be more “to modify a process that is already existed inside” a city, but not “to cause a new process upon (Bertalanffy 1952)” the city. This understanding is important. As technology is more and more advanced, the external environment of cities can be more clearly explored. Then, as long as some rules are given, cities accurately corresponding with their environments can be immediately generated by software. This kind of calculation, being called as “parametric design”, is popular in these days. As a way to assist research and design, parametric design is very useful and inspiring, but we have to keep in mind that a city which only reflects its external environment is incomplete, because it is totally passive. Cities are essentially decided by their internal urban societies which are active. In most cases, external environments are only with secondary importance. A reasonable combination of cities’ internal driving mechanisms and external environments might be a better way in both the study and planning of cities. And, normally, internal mechanisms should be considered as more decisive than external environments.
- About hierarchical order of cities, there are several questions to be discussed. The first and basic question is: of the hierarchical system composed by all cognizable entities, on which level cities are? This question has been discussed in the beginning of Chapter 2.3 and we have got to the answer that urban systems are on a high level if being put into Table 2.2.3-1, and they should be closely related with socio-cultural systems.

The second question is: after the position of cities is clarified, by what means they should be studied? In Chapter 2.2.3.3 of this thesis, an important method, reductionism, has been discussed. To what degree should reductionism be applied is still not clear. The year of Jacobs’ decay on orthodox planning theories which are in line with reductionism was 1961. The year Bertalanffy describes “the limits of reductionism and the gaps in actual knowledge (Bertalanffy 1968, p.29)” based on more theoretical thoughts was 1968. Until today, a comprehensive and conclusive description on cities still seems to be far away; Laplace’s demon has not yet appeared, and reductionism has a lot more effort to make. Here I mean not to question reductionism; different methodologies can coexist, and any one will always, more or less, bring about its own inspirations. It only needs to be pointed out that the traditional methods, the observation and empirical explanation on cities within the limit of our capacity, are still important means to study cities.

The third question is: what are the hierarchical orders inside cities like? Zhou (2002) holds that “an individual urban system is composed of many smaller systems with various size and multiple hierarchies. Their types of integrations are also different: they can either be like a branch, a chain, a spreading net, an atom, or else. The sub-systems are in some ways unified, while they still keep much heterogeneity, and their developments along different directions also vary. Sub-systems like urban economic systems and urban life systems are essentially all parts of the urban social systems that are based on people’s activity and consciousness. In the end, urban systems can be viewed as ‘special giant systems.’” This statement is an abstract description on urban systems, and the complexity of urban systems is apparent. Meanwhile, this statement also agrees with the very fundamental role society plays in cities. Zhou (2002) continues to argue that “in giant systems, systems on higher levels are always decisive for those on lower levels. In urban societies, all systems on lower levels will always be decisively influenced by those on higher levels... But the

various lower systems can also influence the higher systems.” The attitude of this statement is apparently top-down. However, this should not have covered everything for cities. As discussed before, cities are also characterized by CAS—systems that are bottom-up. Therefore, compared with stressing only on the importance of systems on higher levels, it may well be that the complex interactions among “agents” on lower levels have formed and decided the systems on higher levels. Cities should be viewed as combinations of these top-down and bottom-up mechanisms.

- Zhou (2002) also describes the borders in urban systems: “there are close and penetrative borders, static and changeable borders, potential and non-potential borders, real and virtual borders... Urban systems are becoming more complex internally, and are also being more and more influenced by the external environment. The interchange of resource, information, and energy often happen through borders... If these interchanges stop ... urban life also stops.” I would like to provide some supplementary explanations for the above statement: if the interchanges stop, the stop of urban life is not immediate; the urban system will degrade first, and then it will stop. From a systems’ point of view, if the interchanges among sub-systems stop, they are no longer related with each other. The whole system therefore becomes simple aggregation of the sub-systems, so it is degraded. Also, the sub-systems become close systems from open systems. Inertia will maintain the running of the sub-systems for a certain period of time, like the process of chemical reactions, and then they will reach new balances, like chemical reactions reached new balances. At this time, an urban system is stopped in the real sense. This is not just an imagined, abstract discussion. Actually, many means people adopt in urban development are hampering interchanges and are causing isolation. This is hampering the development of urban systems, and its actual results are always negative. I will discuss this further in the following part of this thesis.

How to understand the concept of border is also very important, as it is easy to be misled by the literal meaning of the word. A border is not necessarily a visible and clear one. As stated above, it may well be a virtual one. Meanwhile, even for the real borders, they can be very blurry or complicated, as the urban social systems are blurry and complicated as so. As long as the interchanges of resource, information, and energy are guaranteed, no matter how the borders look like, their functions are met. Sometimes, the clear and visible borders may instead hamper the interchanges, like “border vacuums” described by Jacobs. Railway, highway, and the fence of gated areas such as residential communities, parks, universities, factories, etc., are all typical border vacuums. This is an isolation which makes people staying in two sides difficult to interchange anything, and it therefore hampers the healthy running of an urban system. More details about the disadvantages of border vacuums and how to reduce these disadvantages are discussed by Jacobs in her 1961 work (Chapter 14).

But there are also some visual borders that should be viewed as positive—penetrative borders. In cities, the most common kind of penetrative border is formed by the different types of space on its each side. The two sides should be open to each other, people should be able to freely cross the boundary, and there should also be enough connections between the two sides to facilitate people’s cross-use. For example, the border can be one that is between a big public building and an open residential area or that is between an aged area and a newly built area. For this kind of border, the difference lies primarily on the types of space. This difference strengthens the recognizability and identifiability of space, giving people different but clear impressions on the spaces. More importantly, unique identification is a part of urban history and urban culture, and examples can be a historical block or a famous commercial center. This kind of border affects people’s eyes and minds, and is right the field for the designers to exert their talent. If an urban space is not well designed only for esthetical purpose, but also it collaborates well with other conditions that facilitate a healthy urban system, it will be a lot more beneficial.

### 2.3.4 Cities as Complex Adaptive Systems

As have been argued before, cities are combinations of organisms and CAS. In this chapter, we will discuss cities from CAS's point of view. Holland (1995) has taken cities as examples many times to illustrate his CAS theory. Some concepts in this chapter have already appeared in the earlier chapters, mainly in the attempt of relating cities to organisms. These overlapped concepts might not be explained in precisely the same way as in the earlier writings, as they will follow the structure of the thought of CAS. This may cause some inconsistency or even contradiction. However, considering that there might not be a universal theory to explain everything, this attempt to explain cities under inconsistency seems justifiable. Studies from various angles will bring about a more comprehensive understanding of the reality.

First things first, the two fundamental concepts in CAS, "agent" and "adaptation", perfectly applies to cities. "Agent" refers to the users of cities—individual people and all types of groups of people. "Adaptation" means, in the broadest sense, the mechanisms how people interact with others. Adaptation is the main source of cities' complex temporal patterns. Next, we will see how the seven basics of CAS summarized by Holland facilitate the understanding of cities.

For the first basic, aggregation, what needs to be clarified is that, in this paragraph, we will take its second meaning, "the emergence of complex large-scale behaviors from the aggregate interactions of less complex agents". Aggregation is indeed the prerequisite of all CAS. No interaction will ever happen without aggregation, while interactions are what a system essentially lies in. Although there are many definitions on "city", none of them contradicts with aggregation. A very common way to classify cities is by their population, and this is obviously in line with aggregation. But what we always need to remember is that aggregation is only the first step of the development of urban systems, and the following, more complex basics are indispensable as well. Aggregation cannot guarantee a good city on its own. Many developing cities have huge populations, such as Dhaka, Beijing, and Mexico City, but they also have big problems. For many reasons, people in those cities have aggregated, but are not organized well enough to have good follow-up interactions, so this kind of urban system is still unsatisfactory. A more radical example is refugee camps. There the degree of aggregation is much higher than most normal cities, but they are obviously far away from real cities. Therefore, after aggregation, the following basics are also important.

For the second basic, tagging, it plays an important role in urban systems. In cities, people's social behaviors are highly reliant on tagging. For example, nearly every functional building in a city needs to have tag so that it can be found by the users. Only after the buildings are found, will the follow-up interactions happen. The most commonly seen tags in cities include the features of spaces and the abstract information stick on spaces, for example slogans and logos. Tags are an important part of urban spaces, and they are diverse in cities. In addition, other than the visible tags, reputation of spaces can be viewed as an invisible tag. The reputation tag is no longer instant, but will accumulate throughout time, and it will also have a big impact on whether a place will prosper or decay.

The third basic, nonlinearity, is also obvious in cities. The reason is that the two reasons of nonlinearity, the heterogeneity of agents and their diverse ways of interaction, are obvious in cities. To be specific, the reasons are the heterogeneity of people and the diversity of their relationships. This is an important basic for cities. Ignoring this is like playing chess by "collecting statistics on the way pieces move in the game (Holland 1995, p.16)". There are too many efforts ongoing on how to adequately reflect cities' nonlinearity, and it is hard to summarize them here. But if without these efforts, the future is clear: from the social point of view, totalitarianism is a perfect example which views individuals as particles that are essentially the same, and can therefore be easily controlled through statistics—this is a completely linear approach. For cities, many urban planning methods are based on

statistics, and are therefore largely ignoring cities' nonlinearity. But of course, the expression of cities' nonlinearity demands much more advanced technology, and we are still on the way.

The fourth basic, flows, has already been discussed in Chapter 2.3.2 of this thesis. Therefore, for many points about flows, I will not repeat here. What I would like to discuss here are multiplier effect and recycling effect. Both the two effects imply the importance of building up networks of people, of resource, and of information: once substances start to flow along networks, the summative effect is much greater than when they are static. As have been argued in Chapter 2.2.4, both the two effects are more intensely running among different kinds of agents, as Holland (1995, p.31) has argued: "the recycling of resources by the aggregate behavior of a diverse array of agents is much more than the sum of the individual actions". Relating to cities, this actually implies the reasonableness of a mix of people of different professions and in different statuses, as stable interactions (flows) are more likely to be maintained thereafter.

For the fifth basic of CAS, diversity, Jacobs has already introduced this concept into the urban field and has given extraordinary arguments. Those arguments are already cited in detail in Chapter 2.1.2 of this thesis, and I will not repeat them here.

The sixth basic, internal models, can be used to explain the basis human—the agents in urban systems—rely on which decides their activities. This is an issue involving in multiple subjects such as biology, psychology, behavior science, etc.; I do not intend and I am unable to discuss this further. But this point can justify people's autonomous behaviors again. Human should be viewed as active and rational individuals, being always ready to take new chances and to have new evolutions. A pre-defined and limited arrangement can never fulfill the real needs of people. Those planning theories which tend to pre-define people's life have all, more or less, misunderstood the human nature. A man is not a passive animal which satisfies with a certain situation; he is always developing his own, internal model—this is a process of active evolution. More details about this kind of evolution is too big an issue and cannot be fully stated here, but at least there are some basic requirements for urban planning which are, firstly, not to hamper people's autonomous behaviors and , secondly, if possible, to provide some conveniences for people's behaviors and to provide them with more possibilities. Have these requirements, seemingly very simple, been fulfilled in orthodox planning theories? This will be further discussed in Chapter 2.4 of this thesis.

The seventh basic, building blocks, can be used as tool in urban planning, and of course, limitedly. We can observe how the various parts, which are, largely, people and groups of people, of cities aggregate and work together with other parts, summarize some generally satisfactory combinations of them, and spread them to other parts of cities. The various combinations should be able to fulfill various needs. But we should keep in mind of the limitation of this tool: once the parts are taken out of the whole, their connections with the whole are lost, so they will always have some change. Therefore, in all cases, special analyses considering their unique situations respectively are necessary. Compared with reductionism, this tool seems better. It does not, like reductionism, cut the cities into the very basic units and then rearrange them randomly; instead, it tries to maintain some well-running combinations. As a result, more mechanisms in cities will be maintained.

### 2.3.5 Summary

Before summarizing Chapter 2.3, a point reached in the former writings should be put here as a reminder, which is: a premise of Jacobs' arguments is that cities are a problem of organized complexity. Then, recapitulating the understandings of cities from systems' point of view reached in Chapter 2.3, there are following points:

#### **About the wholeness of cities:**

- Urban systems have characters of both organisms and CAS.
- Urban systems are whole systems.
- But the wholeness of cities should not be over-emphasized.
- The essential wholeness of cities lies not in visual wholeness, but in the broad interactions among people and groups of people.
- Mixed use of land and flexible land policies may essentially facilitate the systematic development of a city, and that is to facilitate cities' wholeness in a real sense. (Also, urban planning should respect the kind of spaces derived from the traditional urban life-styles and should try to maintain their internal social mechanisms.)

#### **Cities as open systems:**

- The demand of input of energy is a nature of cities as open systems.
- Dynamic flows are the essence of cities, but not their static structures.
- Theoretically, the development of urban systems is without a final status.

#### **Some other important points of cities:**

- Cities are active systems.
- There are hierarchical orders in cities, and the way different hierarchies coexist is very complex.
- Reductionism cannot reflect everything about cities.
- Cities are combinations of both top-down and bottom-up mechanisms.
- In cities, the concept of border should be understood as broad and flexible. Border vacuums should be avoided, and penetrative borders should be encouraged.

#### **Cities as Complex Adaptive Systems:**

- "Agents" in cities are people.
- The mechanism of adaptation should be strengthened in cities.
- Aggregation of people is a prerequisite for urban systems.
- Various tags play an important role in cities.
- Cities are systems of nonlinearity.
- Mix of different people facilitates the flows in cities.
- Diversity is an important feature of cities.
- People's autonomous behaviors should be respected and, largely, encouraged.
- Taking combinations of parts of cities and introducing the combinations to other places can be a useful tool in urban planning, and it looks better than reductionism.

## **2.4 Reviewing Planning Theories Using Systems Theory**

So far, carrying cities on shoulder, we have climbed up the mountain of systems theory. Now, standing on this higher point, we could more clearly see where we have passed and what they are—we will review various planning theories. In this chapter, both Jacobs' theory and orthodox planning theories will be reviewed. Of the orthodox planning theories, 3 most representative and influential ones are chosen: Howard's Garden City, Le Corbusier's *<The Athens Charter>*, and Perry's neighborhood unit<sup>13</sup>. Howard's Garden City is the origin of orthodox planning theories; it sets an initiative with a "green and quiet spirit". *<The Athens Charter>* represents Le Corbusier's thoughts on urban planning which is tremendously influential, and which is viewed by Jacobs as a

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<sup>13</sup> Most other orthodox planning theories are either developed versions or combinations of the parts of the three theories above. For example, Unwin's satellite cities are an application of Garden City onto the existing cities, Wright's Broadacre City has many things in common with Garden City and is even more decentralized (although Wright emphasizes on individuality and rejects Howard's collectivism), and many ideas in Stein's *<Toward New Towns for America>* is in line with Perry's neighborhood unit.

“vertical version of Garden City”. Neighborhood unit, under the name of Perry, and being with many followers, is a series of detailed plan which make the former thoughts in orthodox planning theories concrete.

Each of the above mentioned theories will be briefly introduced. Then, how much it is in common with, or in conflict with, the understandings of cities we got in Chapter 2.3 will be discussed. This chapter is the last part of the theoretical part of this thesis.

### 2.4.1 Reviewing Jacobs’ Theory

A very cornerstone of Jacobs’ theory is the attention on the sidewalks and people’s activities that take place on there: sidewalks shoulder the functions of safety, contact, and assimilating children. Jacobs also points out that it is an “intricate and almost unconscious network” that keeps the urban streets safe. She implicitly views cities as systems as combinations of urban spaces and urban societies. However, for a long time, the spatial part of cities was paid too much attention while the social part was not. Some even believe that the social part of cities can be freely transformed. Jacobs, decrying the myths imposed on cities and the arrogant attitudes orthodox planners were holding, stresses on the fundamental role urban society plays, and on how it functions. Safety and contact are about the way an urban social system runs presently, and assimilating children is about how this system evolves throughout generations. These three functions Jacobs summarizes are concise, but they are indeed essential for urban systems.

“Continuous users on the sidewalks” is one of the three qualities Jacobs proposes to keep the streets safe, but its significance is not limited to safety. Referring to the point we reached in Chapter 2.3 of this thesis that “dynamic flows are the essence of cities”, it is right the existence of the flows of people that makes a city surpass a machine-like structure and reach a status of being a mix of organism and CAS.

Jacobs also leads our attention to localized self-government. If a city is merely a machine, we will never need to care about the status of a screw (or one atom that makes a part of that screw). But it is right because that cities are, in a sense, CAS, this attention on localized self-government is very important, as it is actually a concern on the two very basic concepts of CAS—agents and their adaptation mechanisms on lower levels.

Jacobs also states about neighborhoods. Firstly, she holds that the concept of neighborhood should not conflict with the higher wholeness of cities. For example, one of the three types of useful neighborhoods is “the city as a whole”. This sounds quite radical, but it is in line with the wholeness of organisms that Bertalanffy has always stressed on. Another useful neighborhood Jacobs proposes is “street neighborhoods”. This kind of neighborhood provides a clear demarcation of private spaces and public spaces, and is also convenient for people’s communication. As the spaces correspond well to the social lives, urban social systems are therefore facilitated by such kind of spaces.

About how to physically design effective neighborhoods, Jacobs particularly emphasizes that the streets, parks, squares and public buildings should be organized into a network. The network, on one hand, makes us think of the continuous flows in organisms or CAS and, on another hand, makes us think of Bertalanffy’s set of simultaneous differential equations (Equation 2.2.3-1) which indicates broad connections among all the components. Then, Jacobs firstly stresses on the mixed use of neighborhoods again, which corresponds to “flows” and “diversity” of CAS, and secondly, she mentions (1968, p.130) the proper size of neighborhoods: being big enough to fight city hall, but not so big that street neighborhoods are unable to draw district attention and to count. This appears to be pursuing a balance among different levels and this balance, in essence, is the key that hierarchical orders will maintain.

Cities are composed of different components. However, the togetherness of the components is not a simple sum. Due to the highly complex relationships among the components, a unit on higher level is formed. Talking about the concept “city”, of course many meanings like residence, greenery, office, commerce, etc., are included. However, it should never be forgotten that a city is, above all, a city; it is a concept on higher level after a combination of all the subordinated elements. A city is, indeed, composed of so many elements, and that is why it has diversity, but it can never be reduced to those components, as the components are not summative. Jacobs illustrates this by the story of “elephant of blind men”, which in theory equals to “limits of reductionism” by Bertalanffy. Therefore it can be found that Jacobs’ understanding of the wholeness of cities is in line with Bertalanffy’s thoughts on organisms.

“Diversity” is a key word in Jacobs’ work. From the point of view of CAS, diversity is a basic point on its own. Next, in the four conditions Jacobs proposes to generate diversity in cities, mixed uses is the first one. Enough observations and analyses based on phenomena have been given by Jacobs, and she also gives some intuitive opinions. Here I would like to review it from the point of view of CAS. Firstly, mixed-use developments have both higher multiplier effects and recycling effects than single-use ones. In this way, mixed use is facilitating flows, and it is therefore facilitating the development of urban systems as CAS, although a more detailed framework to evaluate the effects of mixed uses is still unclear. Secondly, mixed use is obviously facilitating CAS’s basic point of “diversity” in a direct way. Thirdly, being mixed-use or not will also affect the tagging system in cities. Jacobs’ argues (1961, Chapter 12) that single use is often together with single type of buildings, and the building owners have to try everything to advertise themselves in order to stand out from the surrounding buildings, but this over-tagging will make people much confused. Mixed use, however, often comes with different types of buildings. Then, the difference of buildings on its own is already an effective tagging. Eventually, diversity of buildings will work together with a moderate degree of other tags such as slogans and logos, and this will facilitate a healthy tagging system in cities.

Small blocks are the second condition for urban diversity. This is actually facilitating the cross use of the urban spaces. From a CAS’s point of view, this is facilitating the interactions of agents. Small blocks provide chances and convenience but not obstacles for interactions. The third condition for urban diversity, aged buildings, is a guarantee of mixed urban economy through providing houses of various prices and conditions, and it works in a similar way with mixed uses. The fourth condition for urban diversity, concentration, expresses the concept of CAS’s “aggregation”, which is a prerequisite for the further development of urban systems.

So far, it can be found that Jacobs’ theory is, from a systems’ point of view, facilitating the development of urban systems in different ways. Rarely any part of her theory contradicts the principles of the development of urban systems. This can be viewed as a genius or as a coincidence. Or, considering the paradigm of thought of Jacobs which is so much in line with systems approach and especially the complexity of systems, this is indeed a certainty.

But of course, it has to be admitted that the cities of Jacobs’ ideals are still not perfect. In a long term, cities of mixed uses and healthy systems will be challenged by the processes of change, for instance housing areas might experience a social and physical upgrading that will drive out the present inhabitants of the area. This process is called “gentrification”, and it is out of Jacobs’ anticipation. Gentrification is a problem generated when urban systems meet a certain kind of land market. The vitality of city is coveted by a force in the market. When this market force invades and spreads later on, the generator of vitality—diversity—is killed in fact. However, this issue is very far away, and will not be covered by this thesis.

## 2.4.2 Reviewing Garden Cities

In this chapter, I will mainly review Ebenezer Howard's Garden Cities. Other similar theories include Raymond Unwin's satellite cities, Frank L. Wright's Broadacre City, and partly some ideas of Lewis Mumford.

Howard's Garden City is a simple proposal on urban space and a relatively much more complicated proposal on urban society. The space proposal is well-known (Howard 1902, Chapter 1): there is a center city of 58000 people; surrounding the center city, there are units of peripheral cities, and each unit has 6000 acres of land and 32000 population, including 1000 acres of urban land and 30000 urban population and 5000 acres of agricultural land and 2000 agricultural population. Inside the peripheral units, urban land is surrounded by the agricultural land. Once a unit reaches its planned scale, it must be restricted from further growth, and a new unit aside will start to be built. Meanwhile, Howard provides a set of detailed, utopia-like proposals on the urban social and economic reform to help Garden Cities coming true.

There is a common misunderstanding of Garden City that it is merely adding more green fields in cities. In fact, what Garden City originally means is a real combination of cities and the countryside. Howard wants a new kind of city which has both the merit of cities in the old days and the merit of countryside. Garden Cities, like a magnet, will attract people both from the disordered and overcrowded cities and from the dull countryside. Meanwhile, the key of Garden City is not physical things like "avenue" or "green belts"; the key is the total reform of the economy and the society. This kind of reform can reach up to Thomas More's *<Utopia>* (even the tone of Howard is similar with that of More), and can reach down to the various land-reform movements in the communism countries in the 20<sup>th</sup> century. Although Howard asserts that he does not mean to totally eliminate the private businesses, the autonomy of the private businesses and their range of operation are all much restricted. Even if Howard is not really in favor of this kind of restriction and the restriction is purely out of necessity, it does exist. If not, Garden Cities would never be possible.

Howard provides a set of data to argue for his 32000-population urban unit, and holds that once a unit is fully developed, extra people coming to this unit must be led to an adjacent site to start a new, same unit, but should never spread constructions to the rural land that is supposed to surround the urban land. Otherwise, Howard (1902, p.140) writes, it will "forever destroy its right to be called a 'Garden City'." The reason of the limit on population seems to be that more people will cause typical problems in big cities, such as overcrowding and disorder.

From a systems' point of view, Garden City cannot develop continuously, because its development is purely by reconstructing the same units, and the relationships of these units are quite simple: juxtaposition. Howard holds that the future of Garden Cities will be city groups, like Rhine-Ruhr city groups. For this kind of urban system, although each individual city is a whole, the group of cities is not a higher whole. It is just a sum, as there is almost no interaction among individual cities. This kind of system is obviously in a low degree of development, and no matter how many units are built up, the whole system will not develop. Looking at each individual unit of city, it is orderly organized, is with some diversity, and is with a degree of centralization—this looks like a kind of wholeness. However, the essence of wholeness of cities, the interactions of people, is restricted. Of course, restriction is not always wrong. To say it simply, it is a problem of the proportion of free market economy and of national regulation and a problem of how to regulate. The key problem is that the structure of each unit is fixed and is quite close after it is complete, so an urban structure which is dynamic and evolving is missing. As a result, the interactions of people cannot evolve. Through this paragraph, it can be found that for a unit of city as is proposed in Garden Cities, the type of space does not encourage the development of the interactions among people, no matter inside the unit or among different units. As have been argued in Chapter 2.3.1 in this thesis, this contradicts the wholeness of cities and therefore hampers the development of urban systems.

Howard emphasizes the public ownership of land which is commonly seen in today's cities. But in today's cities, this is because of the high density of people: if lands are private, their sizes will be too small to be useful. And, the concentration of people often goes together with the development of cities—they facilitate each other. Concentration of people facilitates more efficient communication and collaboration, which are largely what human society is about. However, the sharing of land in Garden Cities seems not to be out of the above reason. Taking the urban part of Garden City, its population density is 30 people per acre, which equals to that one family, say of four persons, owns 540m<sup>2</sup> of land. This area is so big that the sharing of land is unnecessary. Therefore, the idea of sharing land in Garden Cities seems more to be out of the influence of communism, which is characterized by arranging what people should do, instead of encouraging people to freely decide what they would like to do. Whether this kind of arranged city can run well is indeed doubtful. The doubt on this kind of city is actually the doubt on the communist ideal behind it, and the failure of this kind of cities, if they will, is in reason similar with the failure of radical communism.

What also needs to be pointed out is that Howard's ideas on land price are problematic. He holds that a land policy which is based on public ownership of land, eliminating landlords and breaking monopoly, will bring about a more effective use of land, will facilitate better urban economy, and will realize an amazing vision of cities. He holds that the land price (in his time), especially in London, is a myth caused by monopoly. As long as the new policy is implemented, the myth will fade away and the land price in London will immediately be much lower, and this will facilitate a better use of land. However, land price has its own mechanism. The high land price of cities is not only because of the concentration of people or monopoly of ownership. It is more because of people will take part into a highly developed urban economy which makes them rich, and only that will the land users choose to continue to pay for—either through renting or buying—the land. Indeed, there is a correlation between density of people and the price of land, as a high density of people often positively affects the urban economy, but density on itself is not the key; the key is the wealth conditions of the residents on the land. Otherwise, the land price in slums, suppose there is not a reform plan in the future, should be much higher than that in other, normal areas of cities, because the density of people in slums is very high. What we aim at should not be restructuring a new system of land system, and believing that the controlled price of land will swipe the current problems. On the contrary, land price on itself is an important indicator of the present urban land system. Land price distributes and regulates the uses of land by the power of market: it chooses the winners in competitions—those who are able to pay for the land price. At the same time, land price is also being influenced by the economy conditions on the land. There are mutual feedbacks between land price and the economy on the land. Of course, it has to be admitted that the mechanisms of land prices should always be improved, and they should differ in different cities. And it also has to be admitted that regulations on land price are sometimes necessary, as this may help the businesses that are not so profitable now but with potential in long term to survive. But anyway, to totally remove the land price system is too radical. To maintain and to improve the system, we are actually facilitating the development of the urban system, and this facilitation seems to be in line with multiple principles of cities as partly organisms and partly CAS. Howard's proposal on land policy, however, seems to be like giving up a system that is already developed to a certain degree, and trying to reconstruct a system which is even less developed. On this point, it is similar with his proposal on urban space.

Howard (1902, p.77) describes Garden Cities as being “planned with a view to the very latest of modern requirements”. He also cites G. J. Shaw-Lefèvre's criticism on London's lack of planning: “London has grown up in a chaotic manner, without any unity of design, and at the chance discretion of any persons who were fortunate enough to own land as it came into demand at successive periods for building operations... (With regard to the) small landowners, the only design... has been to crowd upon the land as many streets and houses as possible, regardless of anything around them, and without open spaces or wide approaches. A careful examination of a map of London shows how absolutely wanting in any kind of plan has been its growth, and how little the convenience and wants of the whole population or the considerations of dignity and beauty have been consulted.

(Shaw-Lefèvre, cited by Howard 1902, p.77)” Indeed, if only viewing a city as an esthetical existence, then anything out of visual order is occasional and chaotic. However, compared with Jacobs’ opinion that what lie behind the seemingly disordered cities are actually complex orders of society and economy, Howard’s and Lefèvre’s opinions on cities seem to be too simple. Fairly speaking, considering the background of time of Howard and Lefèvre, their observations are true and their worries are reasonable. However, as they only understand cities by phenomena but ignore the complex social and economic orders which are hidden beneath the surface and which are more essential for cities, their follow-up analyses and proposals are problematic.

In Howard’s mind, cities might not be more advanced than machines: not only their structures are fixed, but also they can be arbitrarily decomposed and recomposed. Garden City is a combination of city and the countryside, a new life-style “partaking of the nature of both (Howard 1902, p.46)”. Howard (1902, p.48) writes that “neither the Town magnet nor the Country magnet represents the full plan and purpose of nature. Human society and the beauty of nature are meant to be enjoyed together. The two magnets must be made one. As man and woman by their varied gifts and faculties supplement each other, so should town and country”. This vision looks beautiful, but it makes me think of Griffin<sup>14</sup>. Do you like the strength of lion or the wings of eagle? Of course people’s preferences differ, but one can never choose both. That is why Griffin only exists in myth. Will the mythical beast become true if lion and eagle are simply combined? Surely not. However, this is the essence of Howard’s theory. He views the countryside and the cities as two completely different things, and believes it possible to combine the two. Actually, the countryside and the cities are all human habitats, but of different kinds or in different stages. Many cities are developed from the country. The development of human habitats has its own principles, and it is better to view these habitats as systems. If problems of these systems are identified, solutions should, of course, be sought. But there must be an adequate understanding of the habitat systems, and the solutions must respect the internal mechanisms of the development of the systems. Howard’s Garden Cities might not be like what he declares, as “a marriage of man and woman, a joyous union (Howard 1902, p.48)”; it is more like decapitating the lion’s head and cutting its back open, and transplanting the eagle’s head and wings on it. After that, will a miraculous Griffin be born? Never. There will only be two bloody corpses of a lion and an eagle. Combining in a simple way shall never be the proper means to treat those highly advanced systems like cities.

To be fair to Howard, he has many considerations about the social structure and the communications among people in Garden Cities. The kind of space he proposes, theoretically, is able to maintain people’s social activities. But the problem is that these expected social networks and activities may not happen in reality due to so low a density of people in the Garden Cities. As a result, “flows” are not guaranteed in Garden Cities, and this contradicts with cities as open systems. Meanwhile, being opposite to the point that “development of urban systems is without a final status”, Garden cities obviously have their final status. After the first 32000-people unit is finished, its final status is reached. No matter how many new units will be built, it is just a quantitative thing, but no qualitative development.

At last, there are some comments on Garden Cities from the point of view of CAS. Firstly, Howard considers too little about the fact that people adapt to their environment. What Howard proposes is a framework with high expectations. People, as agents, are said to be given a certain degree of free choices, but this degree is inadequate compared with what it should be in a CAS. This problem is not surprising at all; it is just a common characteristic of all thoughts in line with communism. Secondly, as the density of people in Garden Cities is low, aggregation is inadequate. Thirdly, reading all the data Howard provides, it can be found that his plan is based on statistics. Therefore, a CAS’s quality of nonlinearity will not be met. Actually, they are even worse than statistics; they are more like imaginations. Fourthly, as has been argued above, a basic point of CAS, “flows”, is not guaranteed in Garden Cities. Fifthly, in each 32000-people unit, there is a certain degree of diversity, although quite limited. And, this kind of diversity is pre-defined and is almost impossible to have further development. The

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<sup>14</sup> Griffin is a mythical beast with eagle’s head and wings and lion’s body.

relationship among units, meanwhile, is right opposite to “diversity”, as the units are just juxtaposed copies. Sixthly, as the degree of freedom of people in Garden Cities is inadequate, CAS’s basic point, people’s internal models will never be developed. This will seriously hamper the development of cities as CAS. Just as Jacobs (1961) points out: in this kind of cities, you have to be docile, and not to have your own thought.

In sum, Howard’s thoughts are close to the thought of Utopia, which means it relies too much on a simple good will and many unfounded suppositions. From the point of view of urban systems, Garden Cities seem to be like giving up urban systems that are already partly developed, and trying to rebuild new systems that are actually less developed and that are with little potential for further development.

### 2.4.3 Reviewing Le Corbusier’s <The Athens Charter>

As probably the most influential modern architect, Le Corbusier’s urban planning thoughts are concentrated in <The Athens Charter>. The charter is a comprehensive statement about the principles of urban planning in a new era, and was first published in 1933. But actually, many thoughts in the charter emerged much earlier, evidenced by Corbusier’s earlier designs, such as the “streets with set-backs” in 1920 and the “city of towers” in 1923.

What remarkable is that zoning is clearly proposed in the charter. “Zoning reforms bringing the key functions of the city into harmony will create natural links between them, in support of which a rational network of major traffic arteries will be planned (Corbusier 1942, clause 81)”. According to Corbusier, zoning will obviously bring about order to cities, but he provides almost nothing to further explain the effect of zoning on the urban society and urban economy. What is more, zoning on itself is in contradiction with what he proposes, “The distances between places of work and residence must be reduced to a minimum (Corbusier 1942, clause 46)”. For zoning and mixed use, considering the simplest conditions on both, the commute distance of zoning is obviously longer.

On the level of urban space, zoning can be also understood as a kind of progressive mechanization, i.e. a moving toward higher wholeness. However, this progressive mechanization is only on paper, and it is probably only a wishful imagination. As has been argued in Chapter 2.3.1 of this thesis, if a zoning is not the result of a natural process under certain mechanisms but is the result of a man made, pre-defined plan, it will often be inconsistent with the state of the urban society. Then, we can say that the urban spaces are over integrated. From a systems’ point of view, this kind of push on urban systems will not really facilitate their development. On the contrary, compared with the mixed-used cities, zoning weakens the communications among people, which will very possibly make the urban systems degrade.

It is also argued in Chapter 2.3.1 that a mixed use of land and flexible land policies will facilitate the wholeness of a city, and will consequently facilitate the development of the urban system. Zoning is fundamentally in conflict with this kind of land use. Therefore, although zoning brings about clear orders to cities, which make cities more understandable and mentally acceptable, it is essentially hampering the development of urban systems.

Corbusier also advocates the separation of pedestrians and automobiles (Corbusier 1942, clause 62) and the provision of a lot of verdant zones (Corbusier 1942, clause 64). These reforms of spaces aim at providing people with better physical environments, but their social consequences are largely ignored. People may not adapt to these new types of spaces at all. According to Jacobs’ observation, a relatively better situation is that users are becoming less and less, and the social lives and urban economy gradually fall down; a worse situation can be that public security is threatened, as the lonely streets and open spaces provided out of good will can be both with rare users, and they may become sources of urban barbarism. The urban society underwent a surgery; its original complex orders were destroyed, but the newly built up orders are problematic. Radical revolution causes too big a change on the traditional urban spaces, which makes people feel difficult to adapt. Therefore, the urban social

system is harmed by the new kinds of spaces.

In *<The Athens Charter>*, “flows” in cities are much considered. However, Corbusier only takes into consideration the flows of automobile, but not the pedestrian flows. The flows of automobile are mainly passively caused by the commute. The flows caused by the autonomous activities of pedestrians are not considered at all. It seems that Corbusier only cares about how to make the annoying automobiles under control and also out of people’s sight, and the social lives on human scale are totally out of his concern. This ignoring of the urban social systems will easily cause their ill-operation.

According to Corbusier’s classification of the four functions of cities, habitation, leisure, work, and traffic, social life should be under the category of “leisure”. However, reading all the clauses under the “leisure” category, it can be found that the only thing of Corbusier’s concern is the lack of open spaces, and he does not have any consideration about how the open spaces should be organized. He clearly mentions parks and sports fields, and he also writes (Corbusier 1942, Clause 37) that “all other buildings for community use” are needed, e.g. youth centers, game rooms, etc. However, in this kind of centralized public buildings, people normally come with a clear purpose, and they will leave after the purpose is met. This is far away from what social lives should be like. The way of social lives Jacobs proposes, the somehow decentralized, complex and networked social lives, is not considered in *<The Athens Charter>* at all.

But, compared with Howard’s Garden Cities, Corbusier’s cities are, after all, more advanced. There is not a theoretical final status for Corbusier’s cities. No mandatory limit is imposed on the forms and sizes of the basic units, and there are therefore much more chances. The problem is that, if the developments of cities are no longer in accordance with their corresponding urban societies, their infinity becomes pointless. Fortunately, as *<The Athens Charter>* has already passed for 80 years, there have been enough reflections upon it, and urban planning theories now are more developed than that time. But interestingly, as I will write later, *<The Athens Charter>* is still super influential in China today. Therefore, it still makes sense that I review on this 80-year-old theory.

In *<The Athens Charter>*, the activeness of cities goes into an extreme: it is a kind of urban development which is almost completely decided by the planners’ pre-plans. The planners play such a mighty role, and the results of their plans are like a total revolution. This is in line with “cities are active systems”, which sounds good. However, similar with the over-integrations of cities, here the activeness of cities is also too much: it is an activeness which is top-down from the very beginning. This kind of development of systems is completely different from the natural evolution of the single organisms or the biological communities; no bottom-up mechanisms are considered, and a clear and fixed target is directly there since the very beginning. What is also there is people’s mighty means to realize these targets. For this kind of complete creation, I can only think of two examples: the creation of the world by God, and the attempt to create a new future for human by communism. The former, I shall say with full respect to religion, is not inside the range of science. The latter, as its results are so clear, does not need me to comment more.

*<The Athens Charter>* also shows a clear feature of reductionism. The first reduction lies in its first clause: “the city is only one element within an economic, social, and political complex that constitutes the region”; the second reduction is that cities are said to be composed of four functions: habitation, leisure, work, and traffic; the third reduction is the more sub-items under the name of each of the four functions, such as different types of works and different levels of streets, etc. However, considering the limitation of reductionism pointed out by Bertalanffy (1968), reductionism should not play a greater role than a method of analysis to facilitate our understanding; it is not everything. Reductionism shows a decomposed picture, just like a building is decomposed into bricks and tiles. This picture helps us understanding more about the bricks and the tiles, but

not about the whole building. This method naturally leads people to the ignoring of the relationships among the components. And then, when the components are shown in front of people, it is quite possible that they are recomposed randomly. If people do not understand the problem properly and they therefore lack the real ability to evaluate, the randomly composed results can be quite plausible. Eventually, people can only refer to some superficial rules, even merely some esthetical rules, to evaluate cities. In my opinion, this is what <*The Athens Charter*> is about.

At last, there are some comments on <*The Athens Charter*> from the point of view of CAS. Firstly, as well as Howard, Corbusier nearly considers nothing about people's adaptation, but merely tries to sell them an ideal way of life based on some suppositions. Similarly, the basic points of nonlinearity and internal models are not considered as well. Secondly, on the point of aggregation, Corbusier's cities are better than Garden Cities. Although Corbusier criticized the too high densities in the traditional centers of cities (Corbusier 1942, clause 9) and much emphasized on open spaces and green belts, which will largely limit high densities, he does not advocate low densities. His collective habitations ensure a certain level of overall density in the cities. But, taking his "city of towers" as an example, looking on a large dimension, the distances among the towers are too far, and this will hamper the cross-tower aggregations; looking on a small dimension, people indeed reach a high degree of aggregation inside each tower, but due to the homogeneity of the social identities of the residents and the same use of the units inside the tower, the follow-up interactions after aggregation are lacking, which makes this kind of aggregation not so useful. Thirdly, given Jacobs' argument that single use of buildings may eventually cause a confusing tagging system, it looks like what Jacobs criticizes are right what Corbusier proposes. The improper tagging system caused by the single use of Corbusier's cities will harm, at least partly, the efficiency of urban systems as CAS. Fourthly, as to "flows", as have been argued above, Corbusier only considers the flows of automobiles, and he is against mixed uses which facilitate multiplier effect and recycling effect. Therefore, the flows in Corbusier's cities are inadequate. Fifthly, diversity is also largely missing in Corbusier's cities. Of the four conditions Jacobs proposes to generate diversity, "mixed uses", "small blocks", and "aged buildings" are all completely missing, and only "concentration" is partly fulfilled.

As a summary, <*The Athens Charter*> transplants many architectural principles, such as clear and visible order, comprehensive design, and meticulous implementation, etc., into the planning of cities. At the same time, Corbusier holds that the future of cities will be drastically reshaped by the automobiles, causing a big change on people's way of life. But the real mechanisms of how cities run, i.e. the social and economic mechanisms in cities, are largely ignored. Corbusier believes that things expressed by the beautiful vision of cities are all people need and are all ideal cities are about. However, the kind of cities proposed by <*The Athens Charter*> is actually in conflict with many fundamental mechanisms of the real urban systems.

#### 2.4.4 Reviewing Neighborhood Units

If people are excited by the visions described by Howard and Corbusier or other proposals alike, the next question is: how to make these visions real. The answer lies in the scheme of neighborhood unit by Clarence A. Perry in 1929.

The abstract mode of space of neighborhood unit is similar with that of Garden Cities. They are both units that are primarily used for residence and that are supplemented by necessary functions, and the units of both have clear and closed borders. Their difference lies in the different scales of the individual units (a neighborhood unit of ideally 7000 people and a 32000-people city) and in whether there are big areas of green belts. Compared with the conceptual Garden City, neighborhood unit is more detailed and more practical, but the paradigms of thinking behind the two are quite similar. In a sense, neighborhood unit can be viewed as an upgraded version of Garden Cities.

The neighborhood unit is also in line with *<The Athens Charter>*. The interval of the formal publications of the two works is only 4 years. What was more, the hatching-up periods of time of the two works were almost the same. What is clearly written in Clause 88 in *<The Athens Charter>*, “the initial nucleus of urbanism is a cell for living—a dwelling—and its insertion into a group forming a habitation unit of efficient size”, indicates the key role neighborhood unit plays in the charter, as the word “habitation unit” means almost the same with “neighborhood unit”. Viewing more details, the mode of traffic, architecture, and urban spaces in neighborhood unit all meet well the requirements of *<The Athens Charter>*. This implies that neighborhood unit will become a main tool in urban planning in the new era (after 1930).

Due to the similarity between neighborhood unit and Garden Cities, they share many characteristics from the point of view of urban systems. A neighborhood unit, like a unit in a Garden City, is also unable to continuously develop itself. The development of a city is through copying new neighborhood units that stand side by side with the former ones. In each neighborhood unit, there is a certain degree of wholeness, but the conglomeration of all the units is not a higher whole, as there is almost no interaction among the units. Therefore, the degree of development of a whole city of this kind will be low. Of course, if the idea of zoning from *<The Athens Charter>* is implemented, some will believe that the interactions among different zones of the cities are built up. But as I have argued in Chapter 2.3.1 of this thesis, this kind of zoning is not the way to facilitate the wholeness of cities; over-integration of cities may on the contrary hamper the development of urban systems.

Perry (1929) writes that “an urban neighborhood should be regarded both as a unit of a larger whole and as a distinct entity in itself”. This statement, on itself, is right. But the problem is that the wholeness in a neighborhood unit is an artificial wholeness, but not one that is due to natural development. Therefore, both inside a neighborhood unit and among different neighborhood units, the expected interactions among people may not exist. And, as I have argued and also as Bertalanffy’s set of equations (Equation 2.2.3-1) indicates, the interactions among individuals are the essential mechanism of a system’s wholeness, but not the visual order, especially when the visual order is achieved through restricting people’s autonomous behaviors.

There are six general principles in neighborhood unit. The first one is that “a residential unit development should provide housing for that population for which one elementary school is ordinarily required (Perry 1929)”. This is a very interesting point, and I will discuss it later.

The second principle is that “the unit should be bounded on all sides by arterial streets, sufficiently wide to facilitate its bypassing by all through traffic (Perry 1929)”. This principle is the source of super blocks. This is obviously in conflict with small blocks and it discourages the diversity of cities. Meanwhile, arterial streets are the borders among the neighborhood units. These borders, according to Zhou’s (2002) classification, are close borders, so they cannot facilitate the exchanges of people and resource; on the contrary, they cause isolations.

The third, fourth and fifth principles are to provide adequate open spaces, institution sites, and local shops. These points are all right on their own, although the attitude behind them is still reductionism. Anyway, they are much less harmful than openly disparaging the communications among people and leading people to retreat into the isolated castles.

The sixth principle is to design a street net which will “facilitate circulation within the unit and to discourage its use by through traffic (Perry 1929)”. Obviously, this kind of street is to prevent people living outside the unit from getting in. And, the internal circulation it aims at may not happen at all, as the repeating spaces and functions inside the unit are not attractive. Therefore, the most likely results of this principle are to lower down people’s communications, to cut the real social networks into pieces, and to kill the key point of the vitality of big cities—“the abundant opportunities and choices (Isaacs, cited by Jacobs 1961, p.115)”. The source of all these

results is probably the fear for the shortcomings of cities in the old days, but actually those shortcomings can be overcome one by one, although not easy. And, I deeply believe that the key to overcome them should be a better understanding of the cities and proper actions based on the understanding, but should never be retreating back into the castles.

Through observing Perry's examples for different situations, deeper understanding of his neighborhood unit can be reached. Perry is a sociologist, so the social aspect of cities is much considered in neighborhood unit. However, I do not think that it is adequately considered. Firstly, the attitude beneath Perry's proposal is still reductionism. To understand this reductionism, we can imagine it to be applied to the human body. Human body is composed of 24 kinds of elements, but if we just take the 24 elements and mix them, even in the perfect proportion, a real human cannot be produced. For the same reason, even if all the observable elements of cities are classified, are prepared and are mixed in the best proportion people calculated, good cities may not be born, as this is not the way cities grow. Secondly, the kind of space neighborhood units produce do not actually meet people's psychological needs. To be more specific, it is the need for privacy. There are detailed arguments on this point in Jacobs' work (1961, pp.55-68), and I will not elaborate here. On another hand, however, the spaces that have been providing suitable backgrounds for people's social activities for long—the abundant, interesting, penetrative, and extensible streets (Jacobs 1961, pp.68-73)—disappeared in neighborhood units, and the reasons are only that the traditional streets no longer meet the need for separating pedestrians and automobiles and that, for those simple minds, they seem to be disordered and out of control. Therefore, the type of space neighborhood unit brings about do not meet the real needs of the urban systems.

From the CAS's point of view, the features of neighborhood unit are similar with those described by *<The Athens Charter>*. The adaptation of people, nonlinearity of urban systems, and the developing of the internal models of people are not considered at all, and tagging systems are also not taken into account. Truly there exists a certain degree of aggregation, but other basic points that should be working together with aggregation such as diversity and healthy and lively flows are all missing.

At last, I would like to discuss the point of departure of neighborhood units, the elementary schools. The self-closed feature of neighborhood unit is because of its preventing of through traffics, which is for the safety of pupils. Therefore, the size of a neighborhood unit should be decided by the number of pupils for which "one elementary school is ordinarily required". However, this worry of the pupils' safety looks unfounded. In a civilized society where traffic is well regulated, car accident on kids is extremely rare. Moreover, the problem can also be solved by sending and picking up pupils by the adults—doing so in the first several years after a kid just started to go to school is not a big burden on a family. It is indeed unreasonable to decide the scale of neighborhoods by the issue of pupils—it should be more up to the social and economic factors of the cities. For example, the size of a neighborhood can be decided by the consideration of localized self-government and of cross-use (Jacobs 1961, pp.130-132).

Other than the worry on car accidents, another consideration to make the elementary schools near home is that pupils will get rid of the harm from barbarism and kidnaps. However, if so, then the children should also be always under the cover of their parents even when out of school time; they could not even play around their homes or go out to help their parents buying some daily stuff. Toward this question, the answer of neighborhood unit is: if everything happens inside the neighborhood unit, and the neighborhood unit is completely closed to the outsiders, there will be no problem; the kids will then be free and totally safe. Yes this answer is perfect. The final status of neighborhood units is reached: isolated castles. What would the lives in the castles be like, and what would be their futures? There have been too many arguments on this issue. To answer in a simple way, this kind of urban castles brings about almost nothing except a safety with the expense of loneliness.

Moreover, if the children are isolated from the society (of course, if this kind of neighborhood unit is implemented all over the cities, there will be no society at all), how should they be assimilated by the society, i.e. grow up? For this question which is based on the traditional point of view of cities, neighborhood unit will of course give no answer, as it aims at shaping new cities and it will never mind forsaking the old mechanisms of cities. More arguments on this issue can be found in Jacobs' 1961 work (pp.74-88).

My personal experience can also prove that the safety on traffic is not so important for pupils. The elementary school I went to lies in the center of a city with a population of 3 million. Right outside the school's gate is an arterial street, so the traffic is always busy, especially in commuting time. Many pupils, including myself, needed to cross that arterial street two times every day. For a 2000-people school, I did not hear of any collision accident in my 3 years' school time. What was of real worry of the pupils is an underpass not far away from the school's gate. The underpass feels isolated and it lacks eyes to watch it. It is with continuous users only in the commuting time of a day. I would never be willing to step down into that underpass other than in commuting time, and I indeed heard several accidents of kids being robbed in that underpass. This fact tests Jacobs' opinion that crimes are more likely to happen at the places where networks of voluntary controls for the public peace are missing. Compared with worrying all day about the traffic safety which is not as serious as imagined, a more urgent thing is to identify those forsaken, dead corners of cities and to improve them.

And, in fact, elementary schools inside neighborhood units are rarely seen in today's China, because children do not always go to the nearest schools. The choices of schools are also decide by many other factors. Therefore, an important intention of neighborhood unit is already forgotten, but its many other features which hampers the development of urban systems, such as discouraging communications, causing isolations, etc., have remained. This is really sad and the situation should be improved. Of course, there are also other reasons for this situation, and I will continue to discuss on them in the following chapters.

As a summary, neighborhood unit successfully expresses the conceptual thoughts of orthodox planning theories and became a widely used tool in orthodox urban planning. But neighborhood unit cannot adequately meet the high complexities that urban systems should have. Therefore, it is very likely to be with negative effect on the development of urban systems. In the advanced countries, reflections and enhancements on neighborhood unit has already been going on for a long time, but in China today, neighborhood unit is still playing a dominative role in urban planning. How to relieve the overuse of neighborhood unit, to increase the complexity of the neighborhood units that are being planned, and to improve the neighborhood units that have already been built up are all important questions, and they will be discussed in the later chapters.

### **2.4.5 Summary**

As a summary of Chapter 2.4, Jacobs' planning theory is much in line with systems theory and, if being used well, will facilitate the development of cities. On another hand, Howard's Garden City looks like hampering the development of urban systems and trying to reduce cities into less developed units; *<The Athens Charter>* by Le Corbusier overlooks many real mechanisms of urban society, and the vision it describes is in many places in conflict with real urban systems; neighborhood units, widely applied as a tool in orthodox planning theories, could not adequately meet the degree of complexity of real urban systems.

## **2.5 Summary of Chapter 2**

As a summary of Chapter 2, firstly, Jacobs' observation and arguments on cities look convincing. To further justify her theory, systems theories such as organismic conception and General System Theory by Bertalanffy and

Complex Adaptive Systems by Holland, are reviewed. These systems theories are applied to cities and some new understandings of cities are reached. Then, based on these, both Jacob's theory and several important ones of orthodox planning theories are reviewed. It is found that Jacobs' theory is much in line with systems theories while the orthodox planning theories are not.

### 3 The Situation of the Contemporary Chinese Cities

Given the theoretical works done in Chapter 2, now it is time to turn our eyes to the contemporary Chinese cities. We will see what are happening in the Chinese cities today, but before that it would be better to know a longer history about the urban development of modern China, and that will be Chapter 3.1. Then, in Chapter 3.2, various conspicuous phenomena in today's Chinese cities and their consequences will be described, and the reasons which caused these to happen will be analyzed. Chapter 3.3 includes more sceneries and stories from my personal life experience in China; they aim at providing more materials to support the arguments in Chapter 3.2, and they also aim at finding some clues for suggestions toward a better way of urban development in China. At last, in Chapter 3.4, suggestions from multiple aspects will be given.

#### 3.1 A Brief History on the Development of the Contemporary Chinese Cities

Although the concerns of the whole Chapter 3 will be more about the current Chinese cities, it is pertinent to briefly introduce the history of the development of contemporary Chinese cities, and that will be what this chapter is about. In the system of Chinese history, “contemporary” means “after 1949”, in which year the People's Republic of China was founded. Also since that year, drastic and continuous change had happened on the Chinese cities, which was essentially due to the drastic change of the Chinese society.

Considering the broad area, diverse cultures, and numerous cities of China, it should be difficult to narrate its urban history along a single line. However, the top-down and centralized governmental system of China, which makes the Chinese cities more or less share some same courses of development and similar characteristics, makes this possible. The time of history will be divided into two parts according to the different national economic policies when, from 1949 to 1978, planned economy was dominating and, from 1978 until now, when marketed economy was applied.

##### 3.1.1 From 1949 to 1978: Short Recovery and Two Decades of Insanity

In this period, China was, namely, purely a communist country. In reality, it was a planned economy plus absolute dictatorship of one leader. Therefore, there was little flexibility of market, and there was too much chanciness of the single leader's will. These two features had both influenced the urban development of China.

With regard to cities, this period can be further divided into three stages. The first stage was in between 1949 and 1957. In this stage, the civil war had just ended and many things were waiting to be done, and urban development was one of these things. The mode of urban development was almost totally transplanted from the Soviet Union: industries were planned and built up, so were the municipal facilities, and so were the units for residence which were applying the idea of neighborhood unit. From a higher perspective, this also means the implementation of the ideas of <The Athens Charter>. Generally, planned economy worked well in this stage—at least it was better than before when there was almost no economy. As a result, cities also got a certain degree of development.

The second stage was in between 1958 and 1964. A remarkable, nation-wide event of this period was the “Great Leap Forward”. The construction of buildings maintained a high speed for several years, but this construction of buildings could hardly be considered as “urbanization”, as the newly built buildings were scattered—they were arranged to support the distributed industries which were “leaping forward”. Decentralization of cities was

clearly proposed as a guideline (Zhuang and Zhang 2002, p.254). There were many problems of urban development in this stage, but compared with the tragedies in other fields, the urban problems do not worth a mention at all. This stage ends with a total failure of planned economy, culminated by a stunning famine in between 1958 and 1962, with tens of millions of victims as estimated.

The third stage was in between 1965 and 1977. In this stage, there happened the world-famous movement, the Cultural Revolution. No matter how this movement is officially explained today, evidences (Gao and Yan 1986) tend to show that it was purely a political plot, and it had nothing to do with economy, society, or culture. All the three things, economy, society, and culture, are just victims of politics. Urban development, being closely related with economy and society, gained very limited progress during these years. The main thought in this stage was that cities should serve the countryside. Therefore, a combination of city and the countryside was advocated, which coincided with the thought of Garden City. The results were that the cities were unregulated and were largely random, the city centers grew very slowly, and spots of industries were constructed at the outskirts of cities. This was a spatial decentralization, but it did not make a big difference, as nothing much was done due to the extremely low productivities of everywhere of the country.

### **3.1.2 Post 1978: Marketed Development**

China began to move toward market economy in 1978, and that has brought about big changes to the country. Economy became better, productivity was emancipated, and it thus became possible to construct more things. Since then, the Chinese cities started their continuous development in a high speed.

Generally, the main thoughts in urban development in this period are: (1) to control the growth of big cities and to facilitate the growth of middle and small cities at a reasonable speed; (2) to facilitate the cities' functions as the place of producing and circulating and as the center of regional economy; and (3) to build up a network of cities of different sizes, with big and middle cities as nodes. Urban planning is viewed as a tool through directing the use of land to work for the overall strategy of the country to achieve its social and economic targets (Zhuang and Zhang 2002, p.255).

Until around 2000, the main consequences, as summarized by Zhuang and Zhang (2002, p.255), were: the areas of cities grew a lot and many new industrial and residential districts emerged from through the city centers to the edges; many commercial districts and recreational districts emerged in the city centers; the overall urban spaces were diversified; the municipal facilities were modernized; old city centers were reformed district by district.

In the very recent decade, i.e. after 2000, what is most remarkable is that the real-estate market has been playing a more and more important role in urban development. Housing has become such a broad and intense concern in the whole China. The real-estate market boomed, the price of housing kept growing and refreshing its own records, but people were still always trying their best to buy their own houses as long as they were able to do so. As a result, more and more residential districts have been built, and are still being built, to meet the need of the market. More details about this phenomenon and its consequences will be discussed later in this thesis.

### **3.1.3 Summary**

To summarize this chapter, planned construction directed by planned economy pushed the development of the Chinese cities for a short time in between 1949 and 1957, but after that until 1978, the urban development of China almost stopped due to the dysfunctional economy of the whole country. After 1978, as marketed economy

was adopted, cities also got fast development; China had stepped into a period in which urbanization in the real sense and in mass had happened. However, after 2000, the real-estate market seemed to be overheated.

## 3.2 The Recent Decade—the Status Quo

In this chapter, various conspicuous phenomena in today's Chinese cities, including zoning, the size of blocks, the degree of standardization, satellite cities, brand-new cities, will be described first, and these phenomena will be briefly commented and their consequences discussed. Then, more effort will be put on analyzing the reasons for these phenomena such as governance reasons, the mode of land development and the way of spatial design and the laws and regulations that are supporting them behind, historical-cultural reasons, etc.

### 3.2.1 Phenomena

Jacobs' writing and thinking are focused on big cities. In this chapter, we will try to observe what have happened in the big Chinese cities of today. Harbin, Beijing, and Shanghai are chosen as the main objects of study. These three cities are all important cities in their respective regions, and they are therefore able to reflect the situations of the whole regions, too. As is shown in Figure 3.2.1-1, Harbin is in the northeast of China, Beijing is in the north China, and Shanghai is in the east China. Another reason to choose these cities is that I have been staying in all these cities for an adequate length of time to get enough firsthand observations. Figure 3.2.1-2 includes the brief maps of the three cities. Yellow rings indicate the borders of the cities, and red dots indicate the city centers. Also, other relevant cities or regions in this chapter, although they are not the focus, are also indicated in Figure 3.2.1-1.

Before all the phenomena which will be mentioned later, a common phenomenon is that the speed of urbanization in today's China is very fast. This is intertwined with the fast development of economy, and they are like the two sides of one coin: the development of economy attracts more immigrants from the countryside into the cities, and the aggregation of people in the cities, in turn, facilitates economy. In this thesis, this phenomenon is considered as a given fact and will not be discussed in detail. This chapter will mainly discuss the specific features in the process of fast urbanization.

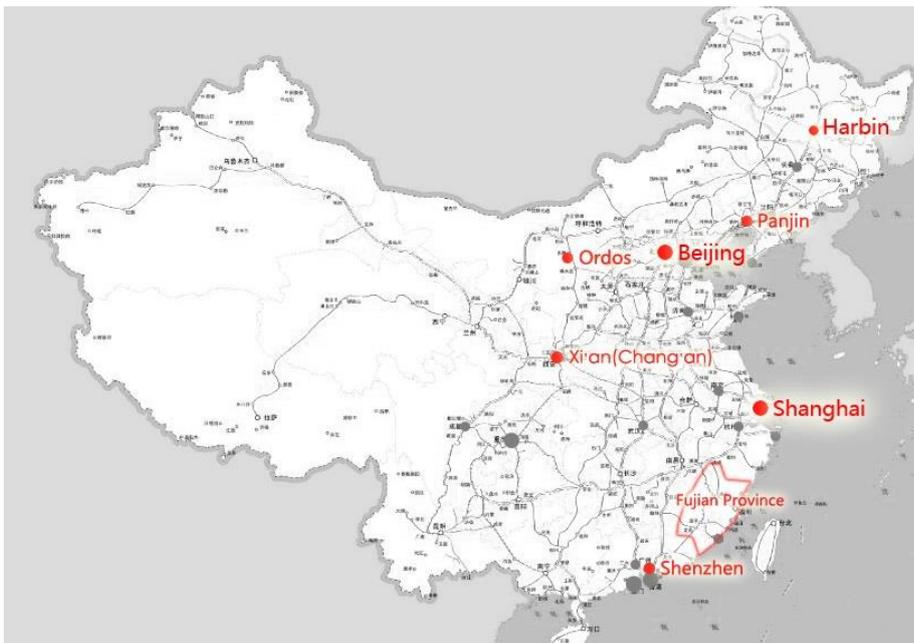


Figure 3.2.1-1. The locations of the relevant cities

Source: Adapted from <http://www.huochu.com.cn/map/>



Figure 3.2.1-2. Brief maps of (from left to right) Harbin, Beijing, and Shanghai (in the same scale)

Source: Adapted from Google Maps 2012

### 3.2.1.1 Zoning

Firstly, a common phenomenon for the contemporary Chinese cities is zoning. Harbin will be taken as the main example in this chapter.

Figure 3.2.1-3 is the land use map of Harbin. A glance on the map may not cause a clear impression of zoning. The colorful map makes the city look as if it has a good mix of various functions. However, for any city, looking at the map of the whole city, the functions will always be mixed. In order to define whether a city is a zoned city or a mixed-use city, it is necessary to have a closer look at its map to see how its functions are distributed on smaller scales, too.

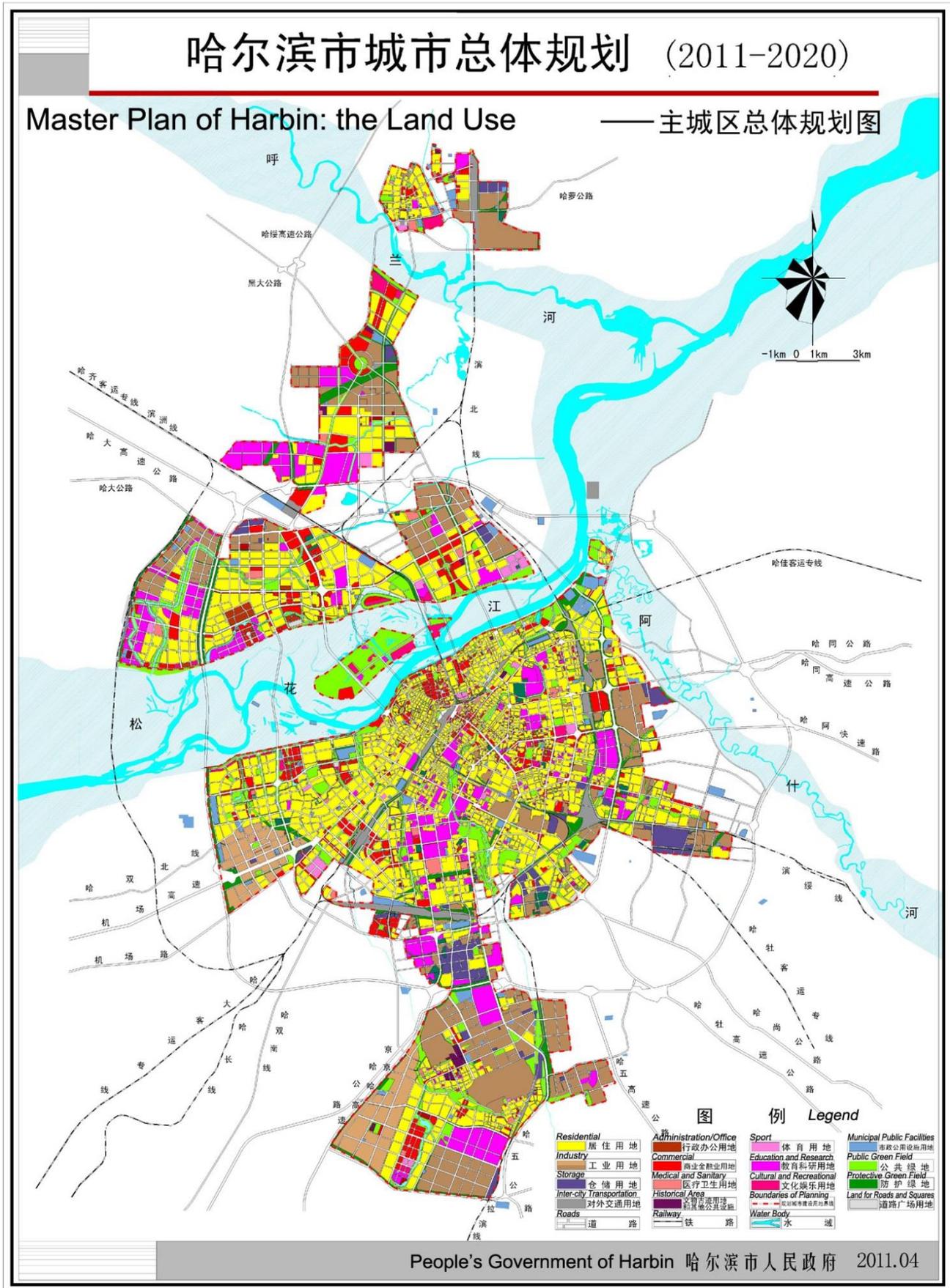


Figure 3.2.1-3. The land use map of Harbin

Source: Adapted from the official site of Harbin Urban and Rural Planning Bureau. <http://61.158.99.130:8084/english/>

Having a closer look at the traditional city center of Harbin (Figure 3.2.1-4), it can be observed that the commercial lands, the industrial lands, the educational lands (university), and the residential lands are indeed

well mixed. There are big commercial centers on the city's level, and are also smaller parcels of commercial land that serve the local residents. The way these functions mix is complex. This pattern is likely to be caused by decades of natural development under an internal mechanism.

However, moving our eyes to the outer city (Figure 3.2.1-5) that is recently built or is planned to be built in the near future, a different vision can be seen: the different functions are more separated, or zoned. It can be observed that except the commercial lands which still emerge in an intermingled way, the educational lands, administrative lands, and industrial lands are much more concentrated, forming zones with clear boundaries.

In sum, although Harbin has preserved its city center of mixed uses, its outer city is being planned in a zoning way. In total, the city is moving toward a zoned city.

And, I am sure it is fair to say that the zoning of Harbin is not unique. In many other Chinese cities I visited in recent years, zoning is such a commonly seen phenomenon. In Chapter 3.2.1.4 and Chapter 3.2.1.5 of this thesis which introduces satellite cities and brand-new cities respectively, it can also be seen that zoning often accompanies with satellite cities and brand-new cities.

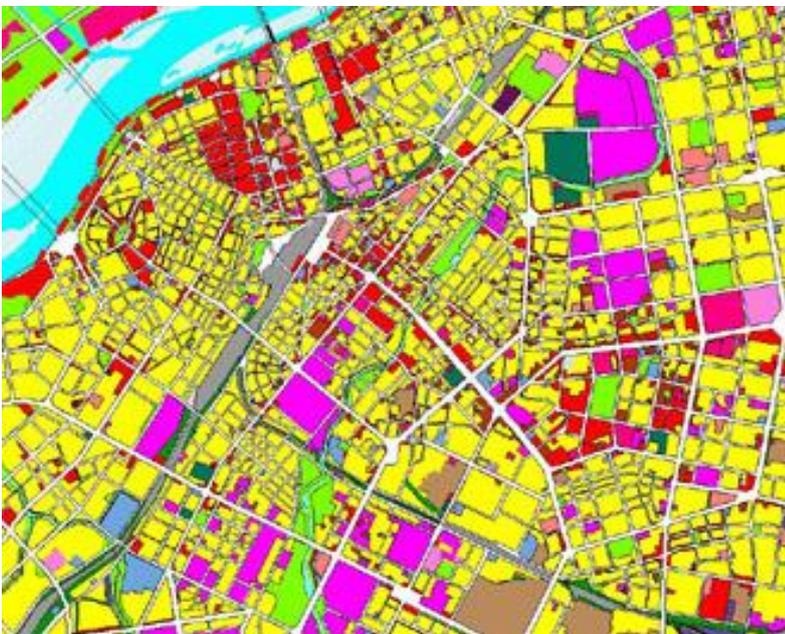


Figure 3.2.1-4. The land use of the inner part of Harbin

Source: Adapted from the official site of Harbin Urban and Rural Planning Bureau. <http://61.158.99.130:8084/english/>



Figure 3.2.1-5. The land use of the outer part of Harbin (in the same scale with Figure 3.2.1-4)

Source: Adapted from the official site of Harbin Urban and Rural Planning Bureau. <http://61.158.99.130:8084/english/>

### 3.2.1.2 The Size of Blocks

Another noticeable phenomenon is that the size of blocks in Chinese cities is becoming larger and larger. Super blocks have been gradually formed.

Taking again Harbin as an example, Figure 3.2.1-6 clearly shows this trend. Figure 3.2.1-6-B and Figure 3.2.1-6-C show two traditional blocks located in Zhongyang Street and Beixiu Garden respectively. Zhongyang Street is the most important street of Daoli district, Beixiu Garden is an important node of Nangang district, and both of the two districts are the earliest centers of Harbin. They were both parts of the plan made in the beginning of the 20<sup>th</sup> century. Although most of the buildings there were built in between 1978 and 2000, the original textures of streets are preserved. It can be clearly seen that both blocks in Figure 3.2.1-6-B and Figure 3.2.1-6-C are on the human scale. Both of them are pedestrian-friendly, forming a kind of network of streets which is in line with Jacobs' proposal.

Figure 3.2.1-6-D and Figure 3.2.1-6-E, in which the buildings were built in the recent decade, show opposite scenery. They are perfect models of neighborhood unit proposed by Perry. The units are surrounded by the arterial streets, forming super blocks. It can be clearly seen that the distances between the streets in Figure 3.2.1-6-D and Figure 3.2.1-6-E are approximately 3 to 4 times of those in Figure 3.2.1-6-B and Figure 3.2.1-6-C. It can be seen in Figure 3.2.1-6-A that the Guxiang area, being shown in Figure 3.2.1-6-E, is at the margin of the city in 1939, and the Songbei district today, being shown in Figure 3.2.1-6-D, is totally outside the city map in 1939. Today, as can be seen in Figure 3.2.1-7, Guxiang area is already a part of the inner city, and Songbei district has also developed a lot and has been included as a part of the whole city.

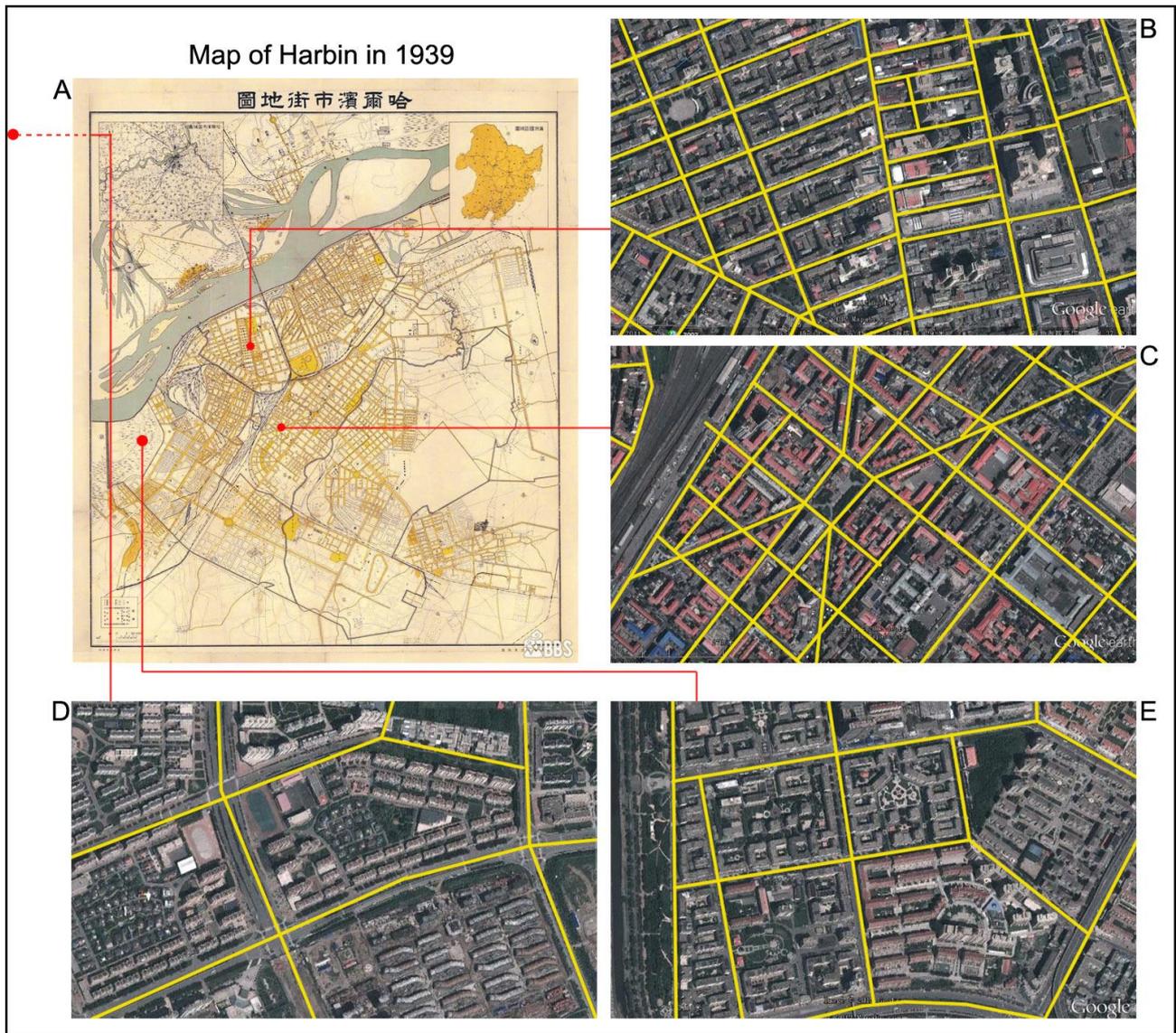


Figure 3.2.1-6. Comparison of the sizes of blocks in different time of Harbin

A: Map of Harbin in 1939; B: Blocks around Zhongyang Street; C: Blocks around Beixiu Garden; D: Blocks in Songbei (river north) district; E: Blocks in Guxiang area. Yellow lines indicate the city streets. (Picture B, C, D, and E are in the same scale)

Source: Picture A from <http://202.41.245.2/bbs/read.php?tid=978>

Pictures B to E are adapted from Google Maps 2012.

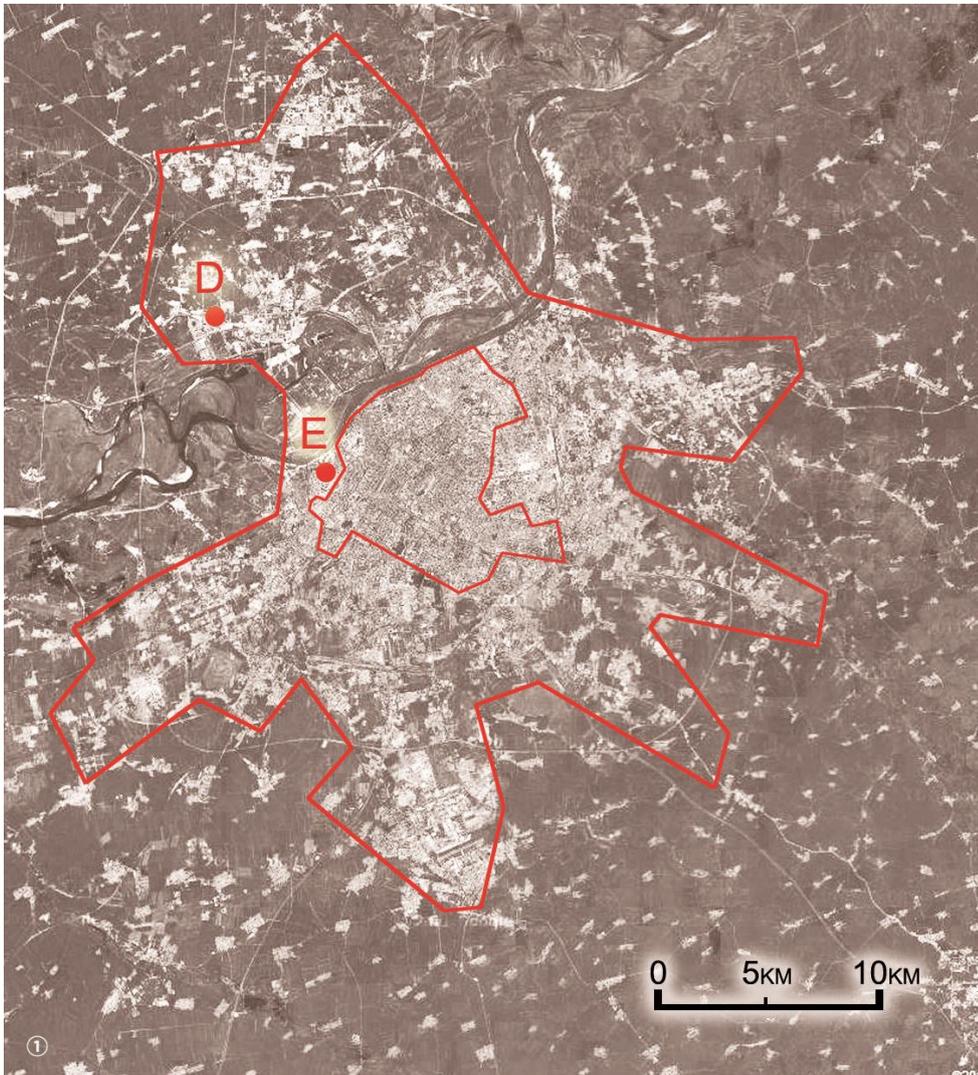


Figure 3.2.1-7. The comparison of boundaries of Harbin in different time

The inner red ring is the urban boundary in 1939, and the outer red ring is the boundary in 2011. Point D and E in this picture are the locations of Figure 3.2.1-6-D and Figure 3.2.1-6-E respectively.

Source: Adapted from Google Maps 2011

It can already be found that many newly built areas, in both the inner city (Figure 3.2.1-6-E) and uptown (Figure 3.2.1-6-D), are composed of super blocks that have much larger sizes than the traditional blocks. A comparison of the new blocks in Harbin with those in cities in other countries can provide a further reference about how large the Harbin blocks are, and that is Figure 3.2.1-8. Typical urban areas in San Francisco, Harbin, London, and Melbourne are put together, and their street networks are indicated in yellow lines (urban streets) and red lines (internal streets of the neighborhood units). The four pictures are in the same scale. For a better correlation, the picture of Harbin in Figure 3.2.1-8 is in the same location with that of Figure 3.2.1-6-E. It can be clearly seen that, if only counting the urban streets, the density of streets of Harbin is much lower than that of the other three cities. The overall density of the streets in Harbin is not low, but it does not make sense, because the streets of red lines are internal, private streets that cannot be used by the public. In the end, it can be found that the size of blocks in Harbin today is obviously larger compared with other cities worldwide. Further influences of super blocks will be discussed in Chapter 3.2.2.

Figure 3.2.1-9 provides another proof for the above observation. From the map which indicates the planning of Harbin's residential areas for the 2010s, it can be clearly seen that the size of blocks are becoming increasingly higher along the direction from the city center to uptown. Considering that the small blocks in the city center are all the already-existed buildings, almost all the newly planned areas are going to be neighborhood units which

bring about super blocks. And, as the map is from the official site of the Harbin Urban and Rural Planning Bureau, it reflects the minds of the officials, and its implementation is unstoppable.

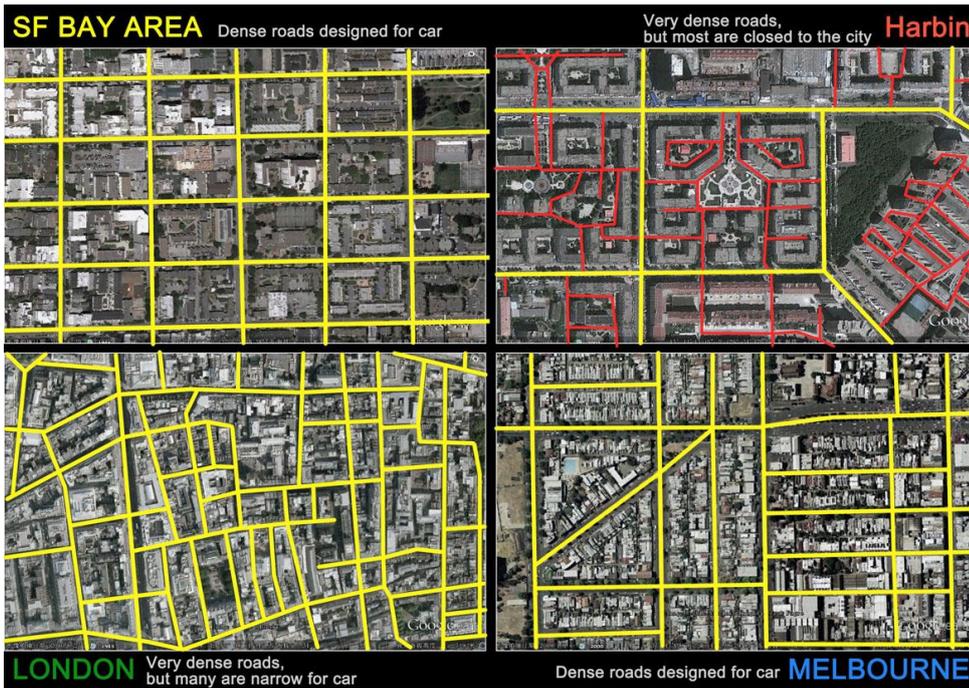


Figure 3.2.1-8. Density of streets in San Francisco, Harbin, London, and Melbourne (in the same scale)

Source: Adapted from Google Maps 2012

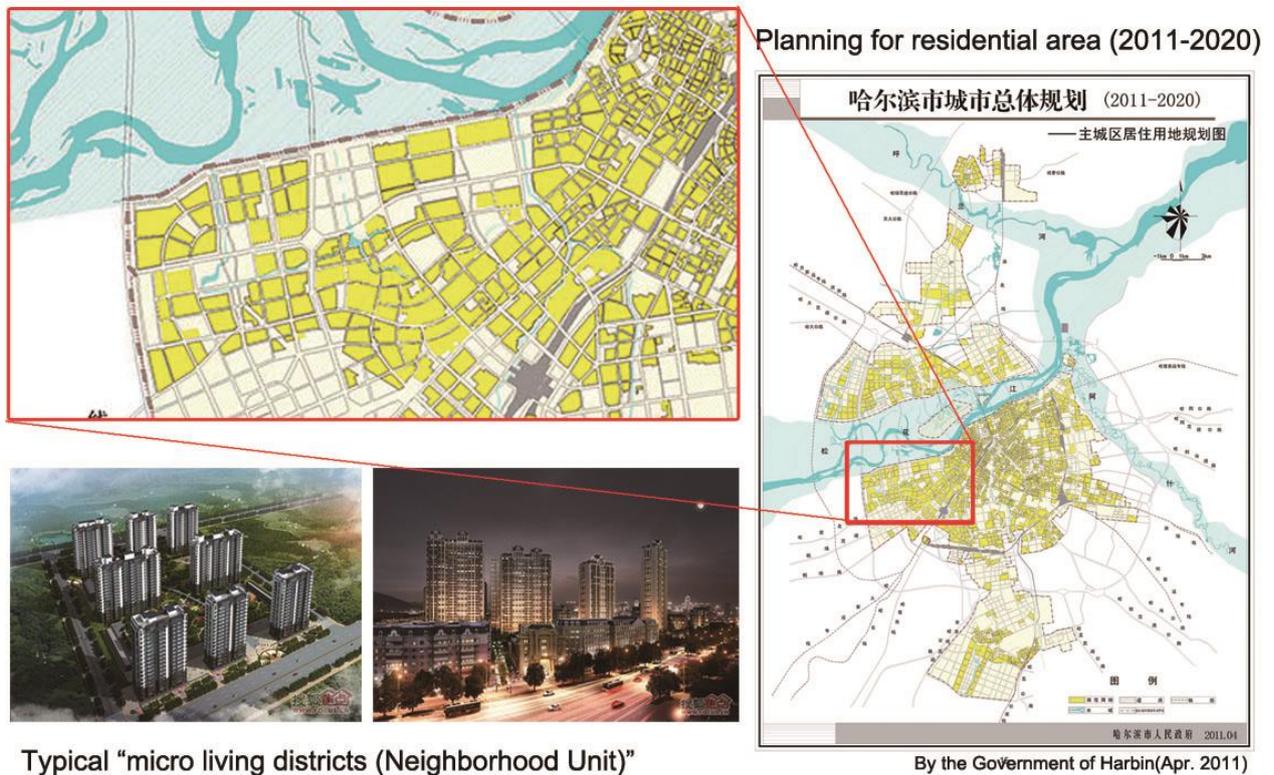


Figure 3.2.1-9. The comparison of the sizes of blocks in Harbin’s city center and in Harbin’s uptown area

Source: Adapted from the official site of Harbin Urban and Rural Planning Bureau. <http://61.158.99.130:8084/english/>

The next question is, is the above phenomenon in Harbin unique? Or, is the same thing also happening in other Chinese cities?

Figure 3.2.1-10 indicates the situation in Beijing. Figure 3.2.1-10-A is the area south to Beijing Railway Station in 2001. It can be seen that only the northeast quarter of this area had been converted into neighborhood unit and all the rest part were traditional blocks that are smaller and are more closely networked. Looking at Figure 3.2.1-10-B, however, the same place in 2012 had already been totally converted into neighborhood units. The size of blocks had obviously become larger.

But it has to be admitted that these neighborhood units are not so closed to the city if compared with the neighborhood units in Figure 3.2.1-6-D and Figure 3.2.1-6-E. The neighborhood units here are with some streets that cross through them, which allow some through traffic. Therefore, putting aside the safety debate and considering the connections to the city only, the neighborhood units here are better.



Figure 3.2.1-10. A: Area south to Beijing Railway Station in 2001; B: The same place in 2012 (in the same scale)

Source: Adapted from Google Maps 2012.

Figure 3.2.1-11 indicates the situation in Shanghai. Figure 3.2.1-11-A shows the area near Dalian Road in 2009. This place locates in the inner city, and is mostly composed of compact, old buildings of 2-3 floors. It dates back to several decades ago, and the traditional urban space and urban life are all largely preserved. Figure 3.2.1-11-B shows an area in between the Out Ring Road and the Middle Ring Road, near Shanghai West Railway Station. Compared with the place in Figure 3.2.1-11-A, it is further away from the city center and is much closer to the Out Ring Road which is the nominal border of the city. The neighborhood units in Figure 3.2.1-11-B were built up around 2002, and it can be clearly seen that typical super blocks were formed.



Figure 3.2.1-11. A: Area near Dalian Road in Shanghai in 2009; B: Area near Shanghai West Railway Station in 2009 (in the same scale)

Source: Adapted from Google Maps 2012.

So far, the conclusion can be reached that super blocks is a very common feature for many contemporary Chinese cities. Actually, other than the three cities mentioned above, I have also seen super blocks in almost every city I visited in recent years, including big cities like Shenyang, Changchun, Hangzhou and relatively smaller cities like Qinhuangdao, Tangshan, Lvshun, etc. The phenomenon of super blocks is indeed nation-wide. This can also be tested by checking the satellite maps of the Chinese cities one by one through Google Earth.

### 3.2.1.3 The High Degree of Standardization of Buildings

Although neighborhood units are bound to cause standardization, the degree of standardization of the recently built neighborhood units in China is astonishing. The pictures in this chapter are only meant to show the phenomenon. More analysis on these standardized buildings will be provided in Chapter 3.2.3.

Looking at all the three figures (from Figure 3.2.1-12 to Figure 3.2.1-14) below, it can be found that most buildings inside a neighborhood unit are almost identical. Only some minor adjustments, such as length, direction, and position, will be made when necessary in order to make the buildings adapt to the conditions of the site. Buildings are set in rows. In each project, there normally is a standard distance between each row. The distance should be in proportion with the height of the buildings, and in each city there normally is an optimum distance after considering some common factors. The four pictures in Figure 3.2.1-12 are showing this; so are Figure 3.2.1-13-A, Figure 3.2.1-13-C, and Figure 3.2.1-13-D, and so are Figure 3.2.1-14-A and Figure 3.2.1-14-B. These are all multi-story residential buildings, which is the most common type being used in neighborhood units in today's China. Variations can be observed in Figure 3.2.1-13-B, Figure 3.2.1-14-D, and Figure 3.2.1-14-C; the former two are high-rise buildings, which are also popular in these days, and the latter one is villanettes, which is becoming less encouraged due to limited urban land.

The differences of the standards lie in the difference of the regions. Taking the multi-story buildings of the three cities to compare, the distance between rows in Harbin is the biggest, in Shanghai the smallest, and in Beijing in between. This is because of the different latitudes of the cities which bring about different solar angles. Then, the standard distances of the buildings should be different if the same length of sunlight is to be ensured in the same given time of year. And, there are also other climate factors that will influence the local building standards.



Figure 3.2.1-12. Neighborhood units in Harbin (in the same scale)

Source: Adapted from Google Maps 2012



Figure 3.2.1-13. Neighborhood units in Beijing (in the same scale)

Source: Adapted from Google Maps 2012.



Figure 3.2.1-14. Neighborhood units in Shanghai (in the same scale)

Source: Adapted from Google Maps 2012.

### 3.2.1.4 Satellite Cities

In the decentralization period between 1958 and 1964, there had already emerged some satellite cities (Zhuang and Zhang 2002, p.254). After 1978, when market economy began and the Chinese cities started to grow faster, satellite cities emerged in mass (Zhuang and Zhang 2002, p.255).

Before we observe the satellite cities, the definition of satellite city has to be clarified. Not all the small cities or towns around the big cities are satellite cities. A satellite city, by its original definition, refers only to a city that is preplanned and that aims to relieve the pressure of people in a nearby big city. Normally, satellite cities are intensely constructed in a certain period of time, and they normally go hand in hand with neighborhood units. Those small cities that underwent natural processes of growth in the past should not be viewed as satellite cities.

Figure 3.2.1-15 indicates the small urban conglomerations near Harbin. The inner yellow circle indicates the old city border, and Harbin Ring Expy indicates the city border in the current plan. There are five conglomerations (in red circles) outside the center city in the picture: Hulanzhen, Hulan, Songbei, Pingfang, and Acheng. It can be seen that Hulanzhen and Acheng are farthest from the city center, and they are not real satellite cities. They both have long histories and had been growing under their own mechanisms well before satellite city emerged as a new concept. Before 2006, Hulanzhen and Acheng were officially independent counties, so they were developing in their own ways and were not so closely related with Harbin.

The Pingfang area should be viewed as a satellite city. It used to be a small town before 1949, and was planned to turn into an industrial area in 1953. After that, it grew to be a typical satellite city in a short time. Residential districts were built up to support the industries. For a long time, it separated away from the city of Harbin, as can be seen in Figure 3.2.1-15 that it is quite a distance away from the old city border. Only in the recent decade, as the city of Harbin grew very fast, Pingfang is now about to be merged into the whole city.

The rest two conglomerations, Hulan and Songbei, are also satellite cities, although they are closer by distance to the city center and look like already to be a part of the whole city. They were only developed in the recent decade. And, they are both in the north side of Songhua River. The river can be seen as a green belt which is typical for satellite cities. Therefore, they are actually still remote from the city center. Having a closer look at Hulan and Songbei, they are both fulfilled with neighborhood units.

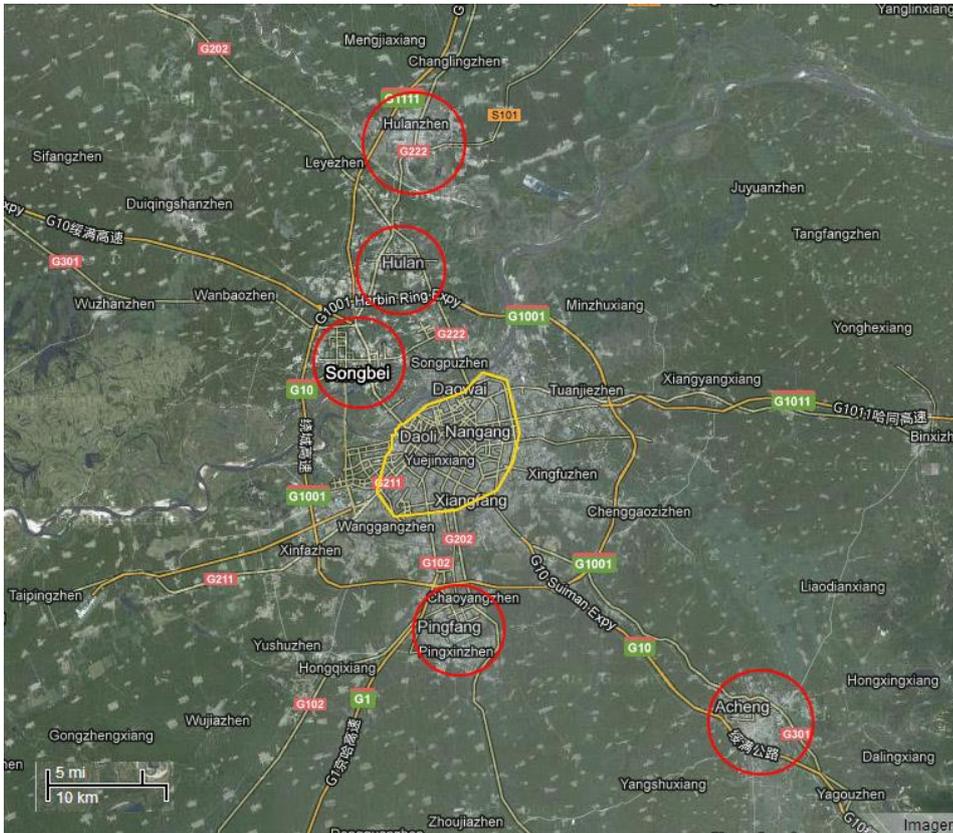


Figure 3.2.1-15. The satellite cities of Harbin

Source: Adapted from Google Maps 2012.

Beijing is a huge city with complicated surroundings, and it will be too long to analyze all the small conglomerations in the suburb of the city. Therefore, I will only show two most famous, representative satellite cities here.

Only in recent decade have Beijing grew faster toward the 6<sup>th</sup> Ring Road. Until around 2000, the S50 Road, i.e. the 5<sup>th</sup> Ring Road, was the border of Beijing. Most conglomerations outside S50 Road are towns and villages that already existed before, but Huilongguan and Tiantongyuan are two exceptions. They are government-led residential districts. With regard to the process of planning and construction, they are totally like typical satellite cities; but with regard to the contents, they are not. Satellite cities should have some industries and should be therefore somehow independent. But as can be seen in Figure 3.2.1-17, Huilongguan and Tiantongyuan are purely for residence, with almost no industry and with only some indispensable supportive functions like restaurants and shops. More discussions on the effects of these satellite cities will be provided in the later chapters.

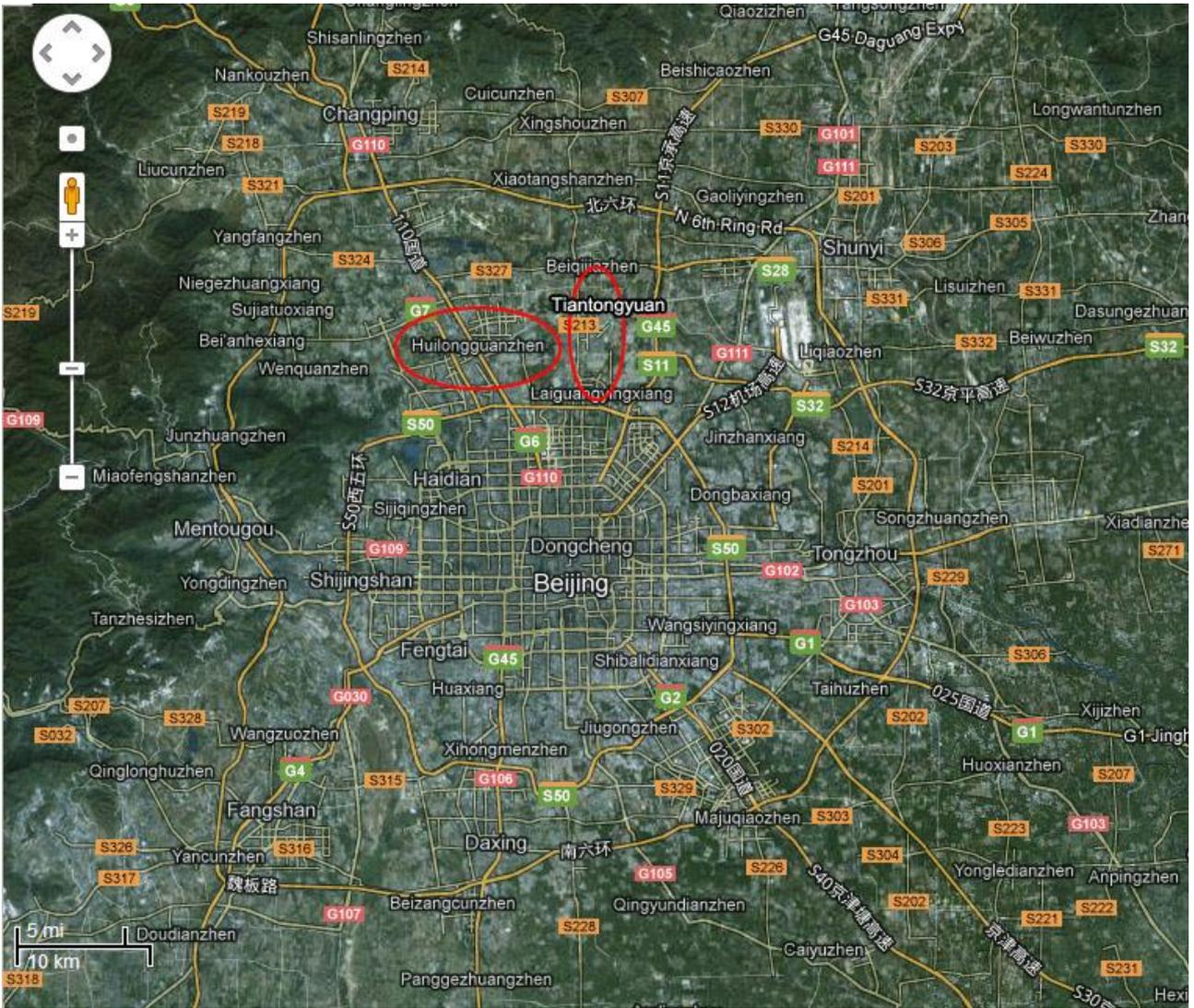


Figure 3.2.1-16. Beijing and its two satellite cities, Huilongguan and Tiantongyuan

Source: Adapted from Google Maps 2012.

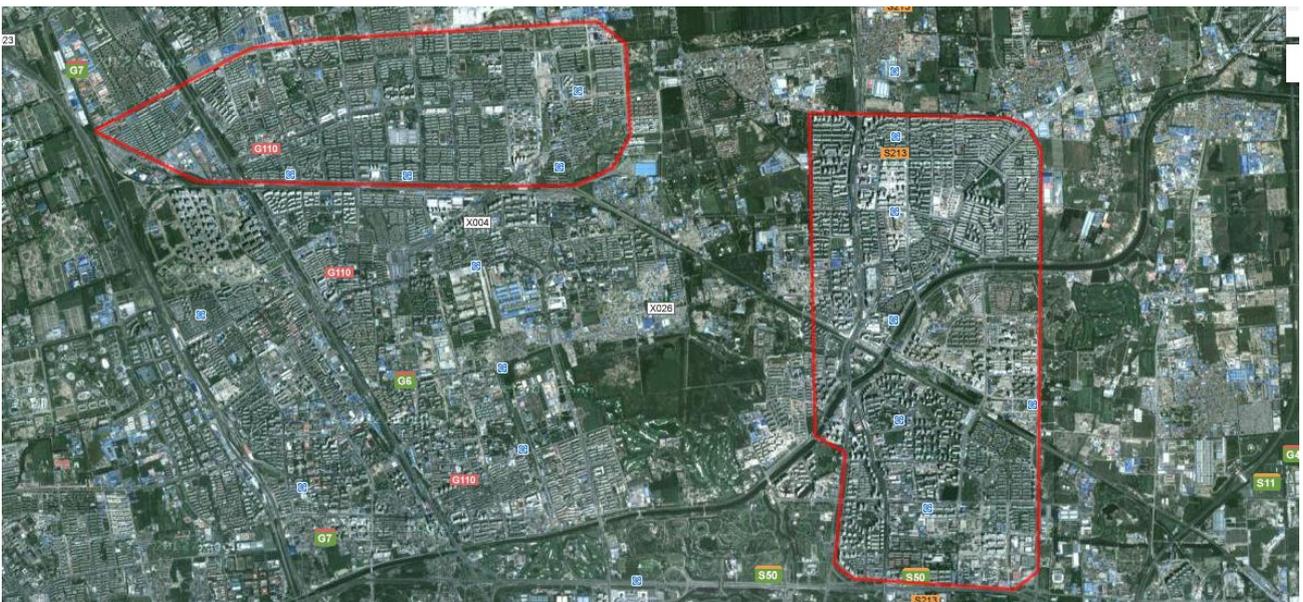


Figure 3.2.1-17. Detailed map of the two satellite cities (the left circle: Huilongguan; the right circle: Tiantongyuan)

Source: Adapted from Google Maps 2012.

### 3.2.1.5 Brand-new Cities

Here, I would like to mention two cities first, Brasilia and Chandigarh. Now China is building its own Brasilias and Chandigarhs.

In the former chapters, it can be clearly seen that so many neighborhood units are built and are being built in today's China. Many of these neighborhood units have merged into bigger areas. Their numbers and the size of the areas formed are astonishing. But those are not the extreme. Extremes are the brand-new cities, which are cities suddenly built up on nothing. In this chapter, other than the three cities we have been focusing on earlier, I would like to introduce several brand-new cities.

The first one is Shenzhen. Shortly after 1978 when China decided to switch to market economy, Shenzhen was appointed as the first Special Economic Zone (SEZ). Huge government-led investments flew into this originally small county with only 300,000 people. Intense constructions were done under preplan. It took Shenzhen only 15 years to reach a population of 3 million, and another 10 years to reach 10 million (Wikipedia 2013, Shenzhen). Figure 3.2.1-18-A is the map of Shenzhen today. It is already a huge city with a complicated pattern, but still, some traces of pre-plan can be observed from the texture of its arterial roads. Figure 3.2.1-18-B, Figure 3.2.1-18-C and Figure 3.2.1-18-D show the drastic change of Shenzhen in the course of development.

Shenzhen has already been there for 30 years, which is an enough-long time for even a totally pre-planned, new city to generate its own mechanism of development. As the inflow of capital into Shenzhen has been always intense and the circulation of capital within it has always been strong, the development of Shenzhen was not merely an implementation of its original plan, but should be with a strong bottom-up dynamic and with its own mechanism. And, in the later period of Shenzhen's development, as the city was growing bigger and bigger, it became impossible to pre-plan everything and informality emerged in the city and has lasted until today. All these reasons make today's Shenzhen no longer a typical brand-new city; it is almost like a naturally grown-up city. Therefore, Shenzhen is only put here as an introduction of the beginning of brand-new cities in China, and I do not intend to study on it further in this thesis.



Figure 3.2.1-18. Shenzhen

A: Map of Shenzhen today; B: The city center of Shenzhen, on construction, in the 1980s; C: Shekou industry area, Shenzhen, on construction in 1981; D: Today's Shenzhen

Source: Picture A adapted from Google Maps 2012

Picture B from [http://history.huanqiu.com/photo/2010-08/1058417\\_3.html](http://history.huanqiu.com/photo/2010-08/1058417_3.html);

Picture C from [http://history.huanqiu.com/photo/2010-08/1058417\\_4.html](http://history.huanqiu.com/photo/2010-08/1058417_4.html);

Picture D from [http://history.huanqiu.com/photo/2010-08/1058417\\_41.html](http://history.huanqiu.com/photo/2010-08/1058417_41.html);

The next brand-new city, Kangbashi new city (Figure 3.2.1-19) in Ordos, Inner Mongolia Autonomous Region, has received extensive attention in recent years. Ordos is a city in the hinterland and is rich of coal mines. It is one of the richest cities in China today. In 2004, the government of Ordos decided to build a new city 25 kilometers away from the old city, which is Kangbashi. To facilitate people's moving into the new city, the government also decided to move its offices, together with many companies, to Kangbashi. Now the first stage of Kangbashi is already completed, being well planned and constructed. In the 32 KM<sup>2</sup> new city, there were only 70000 residents until 2012, which is much less than the city could accommodate. The figure of 70000 is from the official site of the local government, and its reliability is still doubtful. Many independent Medias have estimated much less residents, although the validity of these reports is also uncertain. Therefore, before a both independent and reliable source about the real occupancy rate of the housing in Kangbashi is found, a better way to observe it is to directly look at the real photos. As can be clearly seen in the four pictures of Figure 3.2.1-20, Kangbashi is almost an empty city. What is shown in these pictures is even like a mini-model which shows the beautiful achievement of a modern, ideal Garden City.



Figure 3.2.1-19. The Kangbashi new city of Ordos

Source: Adapted from Google Maps 2012.

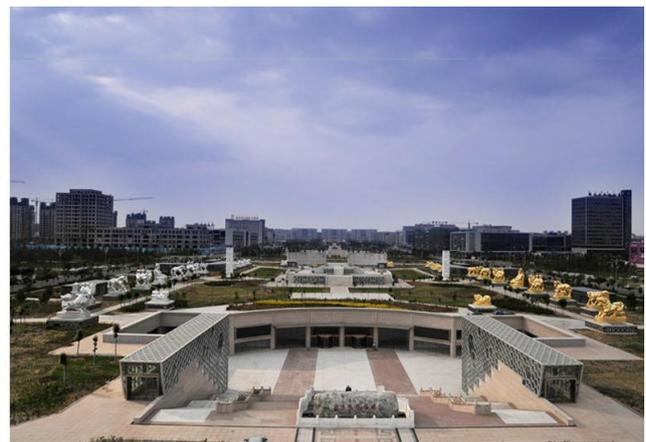


Figure 3.2.1-20. Pictures of Kangbashi

Source: upper left, upper right, bottom left, bottom right, respectively from:

[http://finance.ifeng.com/news/pic/detail\\_2011\\_12/21/11480852\\_0.shtml](http://finance.ifeng.com/news/pic/detail_2011_12/21/11480852_0.shtml);

[http://www.xcb.kbs.gov.cn/tskbs/xdzc/201207/t20120730\\_658995.html](http://www.xcb.kbs.gov.cn/tskbs/xdzc/201207/t20120730_658995.html);

[http://www.xcb.kbs.gov.cn/tskbs/xdzc/201207/t20120730\\_658963.html](http://www.xcb.kbs.gov.cn/tskbs/xdzc/201207/t20120730_658963.html);

[http://www.xcb.kbs.gov.cn/tskbs/xdzc/201207/t20120730\\_658892.html](http://www.xcb.kbs.gov.cn/tskbs/xdzc/201207/t20120730_658892.html);

The third brand-new city is a project I have experienced since 2008, the Jinbo Bay City of Panjin. Many features of this project are similar with Kangbashi project. Firstly, Panjin is also very rich, like Ordos, for its oil industry. This provides a strong financial support for the project. Secondly, Jinbo Bay City is also a certain distance away from its parent city, Panjin. The distance is approximately 40 KM. Thirdly, Jinbo Bay City is brand-new, and the land it occupies was only dotted with small villages before, just like the land for Kangbashi was.

Figure 3.2.1-21 shows the land use of Jinbo Bay city. Yellow indicates residential area, orange indicates leisure area, and red indicates commercial area. It can be seen from this map that this is a typical zoning plan. But of course, in the next stage of planning, each unit of this map will have a more detailed design, and we might expect that a certain degree of mixed use will be introduced (Figure 3.2.1-22).



Figure 3.2.1-21. The land use map of Jinbo Bay City, Panjin

Source: from portfolio of Tianzuo Architecture Science Research Institute 2009



Figure 3.2.1-22. Urban design for Jinbo Bay City, Panjin

Source: from portfolio of Tianzuo Architecture Science Research Institute 2009

An important characteristic of this kind of brand-new city is that everything of it will be highly dependent on the plan on paper, as there was nothing in reality to be based on. The designers can try anything they would like to. The three pictures in Figure 3.2.1-23 show three alternative plans that were not adopted. It can be seen that each alternative is radically different from the others.



Figure 3.2.1-23. Three alternative plans for Jinbo Bay City, Panjin (not adopted)

Source: from portfolio of Tianzuo Architecture Science Research Institute 2009

As a recapitulation of Chapter 3.2.1, in the fast and intense urbanization in China in recent years, there are following phenomena: (1) zoning is commonly used in urban planning in today's China; (2) the size of blocks are becoming obviously bigger, shaping super blocks; (3) the degree of standardization of buildings is very high; (4) there emerged many satellite cities; (5) there even emerged many brand-new cities. It can also be observed that all these phenomena are intertwined with neighborhood units; neighborhood unit is either the reason for the phenomena (for (2) and (3)) or is a tool to support the phenomena (for (1), (4) and (5)). The consequences of these phenomena will be discussed in the next chapter.

### 3.2.2 Consequences of the Phenomena Observed

This chapter is to describe the direct consequences of the phenomena mentioned in Chapter 3.2.1. The descriptions in this chapter will be brief. They just aim to give a quick and preliminary understanding of the aforementioned phenomena, as more elaborated analysis will be provided in Chapter 3.3.

From the perspective of space, there are the following consequences. Both the streets and the buildings become monotonous; the urban spaces lose their identities. Zoning makes a single zone to have only one identity, but not any more than that. The overuse of neighborhood units makes the spaces inside single zones also too repetitive, in short of further variations. The super blocks make the streets to be much beyond the human scale, while they should always be for human. The green fields (also repetitive) are also in short of users. Urban diversity is extremely inadequate. In addition, there is an opinion (Nettler 2012) that zoning is a reason for the traffic congestions in cities, as it increases the total amount of traffic.

From the perspective of society, on the very essence, the features of the contemporary Chinese cities are often hampering the communications among people. Inside a neighborhood unit, according to my personal experience, in the tower-building type of neighborhood unit, the neighbors rarely communicate with each other. If in a townhouse type of neighborhood unit, the communication between adjacent neighbors might be more frequent, but that is already the up-limit ever possible. As have been argued in Chapter 2.1.1.2 and Chapter 2.4.4, the features of neighborhood units are often negative for people's social life if things taken into account in the process of planning are inadequate. Once a city is converted into "parcels of towns", this kind of town will be "full of mutual suspicion and hostility (Jacobs 1961, p.115)".

From the perspective of economy, cities converted into "parcels of towns" are as well deficient. Those intensely invested and rapidly built satellite cities or brand-new cities are often extremely lack of residents, which makes the development of urban economy lose the prerequisite. And, as have been argued by Jacobs (1961), given the spatial composition of such kind of cities, even if they are fulfilled of residents, the economies there will not be healthy. Relevant arguments are also cited in Chapter 2.1.2 of this thesis.

At last, applying the arguments in Chapter 2.3, the phenomena that have emerged in the contemporary Chinese cities, i.e. zoning, neighborhood units, satellite cities, etc., are all indicating an overall decrease of urban complexity. The urban systems are very likely to be degrading, rather than developing.

### 3.2.3 Reasons for the Phenomena

This chapter is to analyze the phenomena that have been described in Chapter 3.2.1 and the consequences that have been listed in Chapter 3.2.2. I would like to stress here that as the cities in today's China are so many, their geographical range is so broad, and their climate and cultural backgrounds are so diverse, there may not be even one reason that applies to all cities. All the reasons to be listed in this chapter should be viewed as partial, and they should be put together to explain the whole situation and be selectively used to explain any single case. And, the relatively higher degree of centralization of China, which brings about a higher degree of homogeneity, justifies this way of explanation. The reasons are mainly categorized into 4 aspects as are shown in the titles of chapters from Chapter 3.2.3.1 to Chapter 3.2.3.4. Each aspect is worth a research on its own, but due to the space budget of this thesis, the reasons will not be much elaborated; they are just meant to build up a general understanding of the phenomena in the contemporary Chinese cities.

#### 3.2.3.1 Governance Reasons

Looking at the phenomena such as the zoning plan, the satellite cities, and the brand-new cities, they all need to be led by a strong (and normally single-lined) organizational force. This corresponds with the current features of governance of China. Normally, the urban development is led by the government, or at least much interfered by the government. Taking Jinbo Bay City of Panjin as an example, as a participant of the project, I could clearly observe the leadership of the local government. The planning was finally decided, of course, by the government, and the construction of infrastructures was intensely invested also by the government. Sometimes the government plays a hidden role at the backstage. It is reported that, if the built up houses are not well sold and the private developers are confronting urgent financial pressure of repaying the loan, the local government could even guarantee for the developers with the government's credit (CEN 2009). It is also possible that the local government imposes pressure on a bank in order to force the bank to postpone the deadline of a developer's repayment (Sohu.com Inc. 2011).

However, the "localized self-government" described by Jacobs (1961, p.114) is obviously inadequate in today's China. Actually, the idea of localized self-government is somehow in conflict with the dominating thought of the country. In the old days of communism, it conflicted with the fundamental ideology; and the heritage of that ideology remains until today, which makes "localized self-government" still conflicts with the way of governance of China today. People on the bottom level are very passive, and they would rather pin their hope on the government to change their lives—another heritage from socialism. I could still remember that once, when I was investigating a slum area (this area will be introduced in Chapter 4 of this thesis), the residents there were timidly asking me when would the government reform the slum—they thought I was a government officer.

To be fair, there are some localized self-governments in China, and there are some urban development driven by that kind of self-government, for an example the urban villages. Urban village can be compared with the "North End" Jacobs introduces in her 1961 work (Chapter 1), an area which was forsaken by both the government and the banks. Jacobs introduces how that forsaken area grew into a charming area with decent buildings and real, vibrant, and healthy urban lives. The growth of North End was purely by the local residents: they fitted up their old and rundown houses, bit by bit, by themselves with extremely limited loans. Figure 3.2.1-1 shows the map of North End in 2008, and the two pictures in Figure 3.2.1-2 show the recent street sceneries there.



Figure 3.2.3-1. Map of North End in 2008

Source: Adapted from Google Maps 2012



Figure 3.2.3-2. The streets of North End

Source: Adapted from Google Maps 2012

The Chinese urban villages are either caused by the fast influx of rural immigrants who are not inside the plan of the city, or by the fast sprawl of cities which encircled the former villages, making them urban villages. Anyway, urban villages are temporarily outside the reach of the government of cities, so the development of urban villages mainly relies on the local residents.

Figure 3.2.3-3 shows the map of Tangjialing, one of the most famous and populous urban village in Beijing, in 2009. It can be seen that the density of Tangjialing was indeed high, but not much higher than that of North End. The quality of houses there, if looking at Figure 3.2.3-4 which shows the interior of an apartment for renting, is quite good. All the daily needs can be met, and the facilities look new and clean. These houses are built by the local residents themselves and are normally without a formal construction permit from the government. The price of apartments in urban villages is as low as less than half the price of apartments with similar quality in the formal neighborhood units. What was more, vibrant social lives can also be found in the urban villages. There are all kinds of businesses, such as shops and restaurants, to support the local residents. When I was living in Beijing

in a neighborhood unit in 2010, a big fun for me was to stroll around several urban villages nearby. Not only I could buy daily stuffs and snacks with good price, but also I was enjoying the lively atmosphere a lot. So far, these all sound nice, and they even bring about an impression that localized self-government is running well there; it is pushing the bottom-up growth of some urban areas and is also attracting people from outside.



Figure 3.2.3-3. Map of an urban village, Tangjialing, Beijing, in 2009

Source: Adapted from Google Maps 2012



Figure 3.2.3-4. The facilities inside a typical rent apartment in urban villages of Beijing

Source: from <http://bj.58.com>

However, looking at Figure 3.2.3-5, the above impression disillusioned. The buildings in urban villages are without even the simplest external decoration. Also, there are no properly constructed streets or public facilities such as street lamps, gas pipes, etc. The reason is that, although the lives here are functionally running well, the residents will never think of living there long. The land owners are all expecting that one day their village will be reformed by the government, which has indeed been happening in many places in recent years, so they will get considerable compensation and will move into the newly built neighborhood units for free<sup>15</sup>. Any unpermitted construction is illegal, and will not be counted in for compensation in the future. Therefore, they will only invest on the very fundamental things which are directly related to the comfort of living, like the interior of rooms. For

<sup>15</sup> Details of policies vary in different cities, but “getting a new apartment for free” is a common standard.

things beyond those, such as the exterior walls, decorations, etc., any investment will become sunk costs once reform happens. Therefore, their efforts of enhancing their community by themselves are totally utilitarian and are with a clear up-limit. Further development of their community by themselves is impossible; the development is bound to be through the government's interference.



Figure 3.2.3-5. Pictures of Tangjialing

Source: from [http://beijing.soulv.com/news/shehui/detail\\_9251.html](http://beijing.soulv.com/news/shehui/detail_9251.html);

So far, it can be clearly seen that government plays a very strong role in the urban development of today's China. Localized self-government is very limited, and those who are now governing themselves are expecting this state as contemporary and are waiting to be covered by the government. At present, governments are still playing the dominating role in the governance, and urban developments are mostly led by the local governments.

The domination of government explains many phenomena in Chapter 3.2.1. Zoning, satellite cities and brand-new cities are only possible when the government is strong, organizing the urban developments in a centralized way. Multiple actors and a bottom-up way tend to cause a complex mechanism, and this normally brings about complex patterns of cities; a single dominating actor which normally imposes a single-lined and top-down mechanism tends to bring about simple patterns of cities. In today's China, the former case is missing, and the latter is what is happening.

### 3.2.3.2 The Legal and Political Mode of Land Development

The mode of urbanization of the Chinese cities is another reason of the phenomena in Chapter 3.2.1. According to the Constitution, the land is forever owned by the nation and, in practice, the local governments are the

actual owners. The local governments sell the land-use right to the developers<sup>16</sup>, and then the developers build houses and sell or lease the houses to people. The income of selling land makes up a big part of the total financial income of the local governments: in many cities, the proportion is as high as 30% (www.landchina.com 2012). Therefore, the more land a local government can sell, the more income it gains. This explains the enthusiasm of the local officials to push up the speed of urbanization.

Then, it is very likely that this kind of artificially accelerated urbanization gives cities simple patterns—complex urban systems are not built up at all. The built up of an urban system relies on the development of urban economy and urban society, and these are all processes that need time. Businesses look for profitable places which are normally places with more residents, and people look for places with more businesses which make their lives more convenient. Also, for both the businesses and the residents, they will undergo processes of development, of elimination, of transfer, etc. After all these processes (which can be viewed as “adaptation” in CAS) are adequately developed, a real urban system is preliminarily built up.

However, for a city or an urban area which is pushed to be suddenly constructed, the above mechanisms have no time to develop at all. As a result, there is not a complex internal structure of the city. Therefore, for such kind of a city, those simple and duplicative features such as zoned districts and highly standardized neighborhood units are just suitable.

Meanwhile, as the total amount of land a local government can sell is constant, there is no difference between selling them in larger pieces or in smaller pieces with regard to the total income. So, the government will tend to sell them in larger pieces, as that is easier to do. Then, a developer who bought a big piece of land will naturally deal with it altogether, and setting borders to encircle his land is a commonly applied way. This will facilitate the emergence of super blocks.

### 3.2.3.3 The Planning and Architectural Laws and Regulations

The planning laws and regulations can also explain many phenomena described in Chapter 3.2.1.

Zoning, although not mandatory, is recommended according to the *Regulations on the Application of the Methods for Urban Plan Formulation (RAMURF)*. Firstly, it is required for a general plan that “the distribution of different kinds of lands should be specified (RAMURF 1995, Clause 7.1.5.2). Then, after the general plan is completed, “a big city or a middle city may make its zoning plan if necessary. Application of zoning on the whole city is preferred when making a zoning plan (RAMURF 1995, Clause 22)...” The result is, as is recommended, that zoning plan is widely applied. Looking back at Figure 3.2.1.5, the zoning plan in China is indeed typical.

Standardization, although will never be clearly stated, is also, at least largely, caused by the planning laws and regulations. In China, one requirement is that “the percentage of greenery coverage in the cities should be no less than 35% until 2010 (Provisions on the Indicators of the Planning and Construction of Urban Greening (PIPCUG) 1993, Clause 4)”. Another requirement, “the distance between two buildings should be no less than 1.8 times<sup>17</sup> the height of the building which is in front toward the sunshine (Urban Planning Regulations of Harbin (UPRH) 1999)<sup>18</sup>”, is there to guarantee adequate sunshine for every building. The requirement for greenery coverage, together with the fact that there must also be other non-building lands such as roads and parking lots,

<sup>16</sup> In China, according to the Constitution, the owner of urban land is forever the government. Therefore, the government could not really sell the land; it can only lease the land to the developers for a maximum of 70 years. However, in this thesis, and also mostly in the Chinese context today, “selling the land” and “leasing the land for 70 years” mean the same. Then, what would happen when the 70 years become due? So far there is still no clear policy with regard to this question.

<sup>17</sup> This number differs in different cities, according to the cities’ different solar altitudes.

<sup>18</sup> This regulation expired in 01 Jan 2012. However, its effects have already been there, and the new regulation will be similar.

decides that the buildings cannot be too dense. And, the requirement of sunshine spacing, not only does it decide an up-limit of density of buildings too, also largely decides the way of distribution of buildings.

Then, thinking in another way, as the land developers will naturally chase more profit, they will try to build as many buildings as possible on their land. Given the strict rules stated above which limit the possible amount of buildings to be constructed on the lands, the developers will have to use standardization in order to build enough buildings to gain profit. Jacobs has provided more in-depth argument on this point (Jacobs 1961, p.214). Actually, some have already explicitly argued that “there is an optimum floor-area ratio objectively if calculating the economic effect, social effect, and environmental effect (Kunming Land & Resource Bureau 2010)”. This consideration, together with the aforementioned clauses of planning laws (and also many other clauses), is an important reason of the high degree of standardization of the contemporary Chinese cities.

### **3.2.3.4 Historical-cultural Reasons: the Traditional Urban Spaces in China**

Cities are, obviously, much shaped by the histories they went through. Also, cities are influenced by the cultures which are closely related to history. A review on the historical-cultural context can bring about a better understanding of the phenomena happening on Chinese cities today. Due to the space limit, this chapter will not go deep into the common courses of development of cities, but will focus on those features that are unique for Chinese cities. The period of history to be discussed in this chapter is from the ancient time to pre-modernism time, i.e. mainly from the Zhou Dynasty (from 11 Century BC) to the Qing Dynasty (ends in 1912), and what will be mainly introduced is the spatial features together with the social-economic development of the Chinese cities. In the end, what will be observed is the unique Chinese urban culture which extends its influence to the present day and, as it definitely will, to the future.

Wall is a common thing for cities in the old days. It indicates defense, it is a symbol of superiority, like the castles and palaces, and also, it is closeness. There are many walled cities in China and many walls remain until today, just like in many other countries, and of course they no longer function now. But, as will be introduced later, there are some walls of other kinds that have shaped the Chinese cities so much, and that are still influencing people’s minds and their behaviors today.

Dated back to Western Zhou (11 Century BC to 771 BC), the Chinese cities were mainly there as political centers and military bases, and were not with many industrial and commercial functions (Zhuang and Zhang 2002, p.17). The layouts of cities were also largely decided by the codes of ritual ceremonies. Here we can peep at the top-down mode of the very early Chinese cities.

However, as the social and economic developments are always the real dynamics of the development of cities, in the Spring and Autumn period and Warring States period (770 BC to 221 BC), there had already emerged more than 20 cities that had boomed due to their economic development. Along with these, prosperous urban lives had also emerged (Zhuang and Zhang 2002, p.19). Here we can find that the Chinese cities got some fine mechanisms for their further development.

But, it can be observed that in the Southern and Northern Dynasties (420 to 589), Sui Dynasty (581 to 618) and Tang Dynasty (618 to 917), a new type of urban space, “Lifang”, had emerged. Lifang is walled and gated square units with sizes of, taking Chang-an city as an example, in-between 26.7 ha and 76.1 ha. As can be seen in Figure 3.2.3-6, these units are highly identical. People were living in these units and were under strict control by the rulers (Zhuang and Zhang 2002, p.57). One reason of the huge size of Lifang is that “they are shaped by the

arterial roads (Zhuang and Zhang 2002, p.61)". Here we could surprisingly find that the Lifangs are, precisely, ancient neighborhood units. And, another reason of their huge size is that "this brings about smaller amount of units, which makes them easier to be controlled (Zhuang and Zhang 2002, pp.61-62)". Here, we can see a tiny difference between Lifang and modern neighborhood units: the purpose of "control" in Lifang is explicit, while the purpose of "control" in modern neighborhood units is implicit, or unconscious.

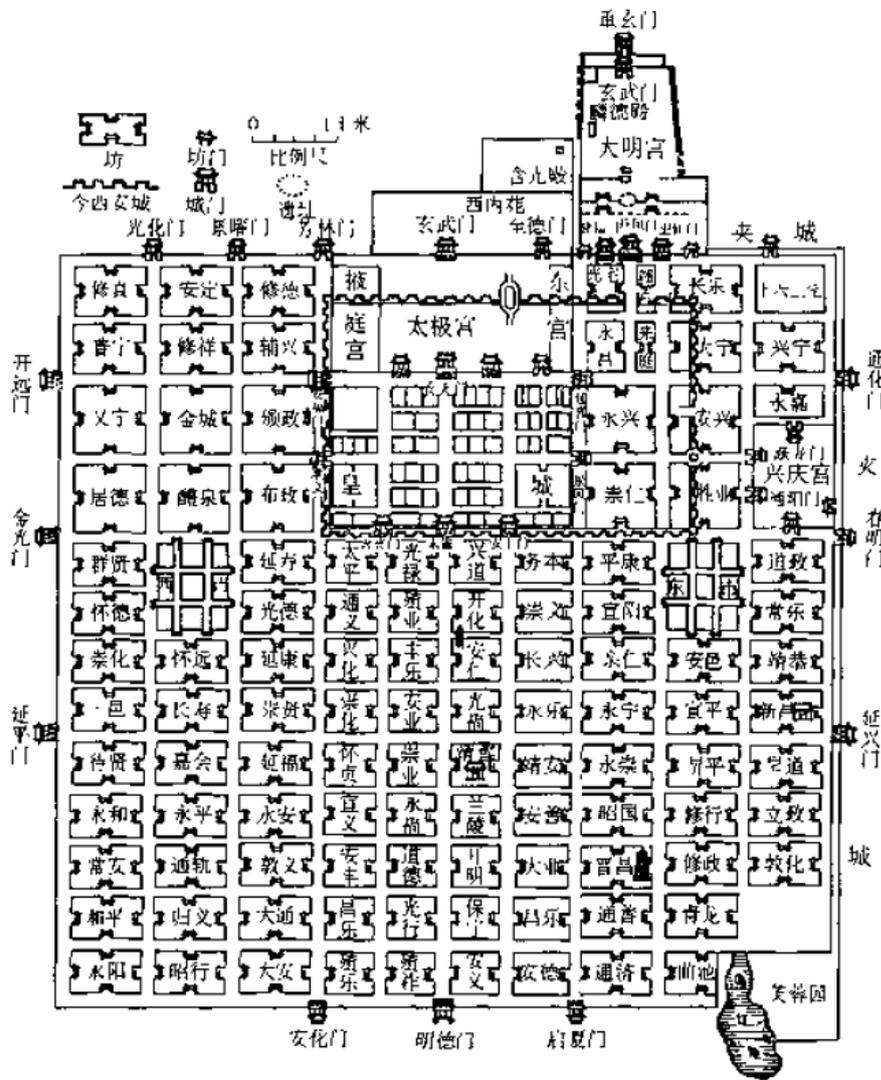


Figure 3.2.3-6. The map of Chang-an in Sui Dynasty and Tang Dynasty

Source: (Zhuang and Zhang 2002, p.59)

The Lifang system collapsed in Song Dynasty (960 to 1279), a dynasty in which handicraft industries and commerce had much development. Only the names of the Lifangs left, and the cities started to have new spaces being shaped by streets and lanes which are responding to the economic development. This indicates that the Chinese cities were evolving from closed structures toward open structures (Zhuang and Zhang 2002, p.89), which is good.

But, in the Yuan Dynasty (1271 to 1368) when the Mongolians ruled the land of China, the Chinese cities somehow went down again. A relatively free economy was tolerated, but the political pressure was very high. The cities remained to be shaped by streets and lanes instead of Lifang, but their general layouts started to mimic the codes of ritual ceremonies in the ancient time (Zhuang and Zhang 2002, p.115).

In the Ming Dynasty (1368 to 1644), handicraft industries and commerce developed, and this situation extended to the Qing Dynasty (1644 to 1911). Many cities got much progress because of this, and many new cities

emerged especially in the south China and the coastal areas (Zhuang and Zhang 2002, pp.120-121).

But, in the Qing Dynasty, the trend of revitalizing the codes of ritual ceremonies in the ancient time was even stronger (Zhuang and Zhang 2002, p.126). And, although the handicraft industries and commerce were neither encouraged nor discouraged, the Qing Dynasty eventually decided to apply a seclusion policy, which cut off the communication with foreigners and which made the economy of the whole country halted. As to cities, except for the increasing number of residents who gradually aggregated, fulfilling the inner cities and stretching to the outer cities, no structural development of cities could be observed.

So far we have followed the brief history of urban development of China. Next, what we have seen will be summarized. Firstly, in the Chinese history, agriculture had been the dominating industry in most of the time. This decides that in the urban-rural system, cities are not playing the key role.

Secondly, although the handicraft industries and commerce got some development in some time, China did not go into modern industrialization and capitalism, which made the economy and society being without much progress. As a result, the urban economy and urban society, as a part of the whole economy and society, did not get much progress. Zhuang and Zhang (2002, p.158) have stated that “if categorizing the origin of cities in the old days into two types, one is aggregating people through the natural development of economy and thus forming cities, the other is forcefully gathering people by means of law, religion, and administration using political and military power, the ancient Chinese cities belong to the latter.”

Thirdly, looking at the Chinese history, it can be found that in most of the time, China was one country. To be precise, most people speaking different Chinese languages and most traditional Chinese territories were under the rule of a single regime. If we compare this with Europe, a big difference can be seen: in most of the time in history, both people speaking different European languages and the geographical European territories were ruled by many regimes. The high degree of unification of China requires effective control on the people. Only when the people are not self-organized, top-down ruling is stable. Willingly scattering people, in this case, is a good tactic for the rulers, and they are very vigilant for any grass root organizations. Lifang is a perfect example for this idea. Even after the Lifang system collapsed, this idea and the way of ruling based on this idea remained until the end of imperial time (1912). This can explain the features of Chinese cities that people tend to be scattered and fixed and that the communications among people seem to be somehow prevented. Moreover, the ideology in the communism period from 1949 to 1978 has similar characteristics with the point above.

Therefore, historically, the Chinese society rarely went through a bottom-up mechanism of development which should be going together with the social and economic development. The Chinese cities, as partly the bearer of the Chinese society, had developed spaces that matched the situation of the society. Generally speaking, the traditional Chinese urban spaces are much more occupied by the scattered and self-duplicating units with very simple internal structures, and are with much less areas that naturally grew up through the development of urban economy and urban society. “Hutong” and “Siheyuan” are representatives of this kind of urban spaces.

“Hutong” refers to the small lanes where ordinary people live in. Beijing is where Hutongs can be found in mass. The scale of these Hutongs is similar with the lanes in the ancient European cities such as Regensburg and Florence. However, the Hutongs’ spatial features are much different. Unlike the European urban road networks that are mainly composed of straight roads with two open ends, the streets in Hutong are serpentine, and many are with only one end. And, as can be seen in Figure 3.2.3-7, the houses along Hutongs are mostly closed toward the streets. What are along the streets are the walls, gable walls of buildings, gates, and windows that are usually high and small. Unlike the buildings in the traditional European cities which give “eyes on the streets”, the traditional Chinese buildings show their backs to the streets. Further story about Hutong will be told in Chapter 3.3.2.

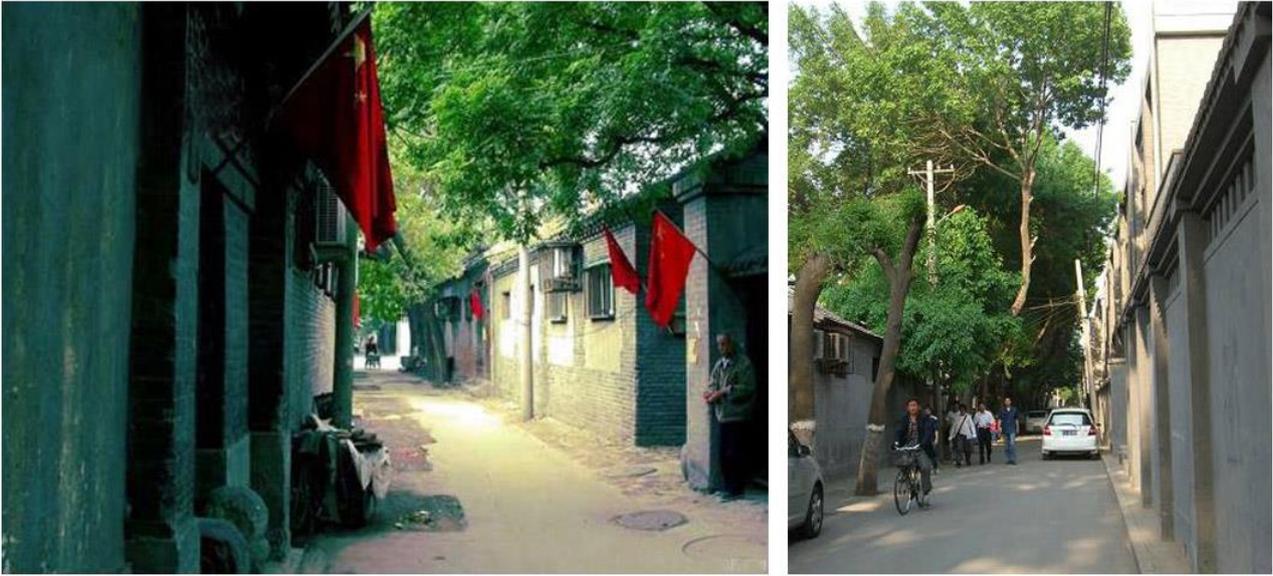


Figure 3.2.3-7. The Hutongs in Beijing today

Source: Adapted from <http://baike.baidu.com/picview/9930/9930/0/7ab514d168b4f4ea572c8483.html#albumindex=0&picindex=5>;  
<http://baike.baidu.com/picview/9930/9930/0/7ab514d168b4f4ea572c8483.html#albumindex=0&picindex=6>;

“Siheyuan” is a common type of building, and many of them are along the Hutongs. Siheyuan literally means “a courtyard surrounded by four buildings”, and in reality the courtyards and buildings can be more. Siheyuan dates back to Zhou Dynasty (11 Century BC to 771 BC). In the old times, one Siheyuan accommodates one family. In the modern days, as the urban residents are much more, one Siheyuan can sometimes accommodate several families. The conspicuous characteristic of Siheyuan, as can be seen in Figure 3.2.3-8, is its closeness. All the buildings are toward the center, and there is only one gate for all these buildings. All a Siheyuan can contribute for the city is its sole gate, normally closed, and a row of windows that are very high (also can be seen in Figure 3.2.3-7), which means they aim at totally cutting off the inside-outside connection of sight. The delicate design of Siheyuan indicates that it is totally deliberate: this kind of space is considered as the most proper by the people. Siheyuan is a unit on a lower hierarchy compared with Lifang, but it as well has many things in common with modern neighborhood units: the key ideal, defense, and the key feature, isolation, are indeed the same.

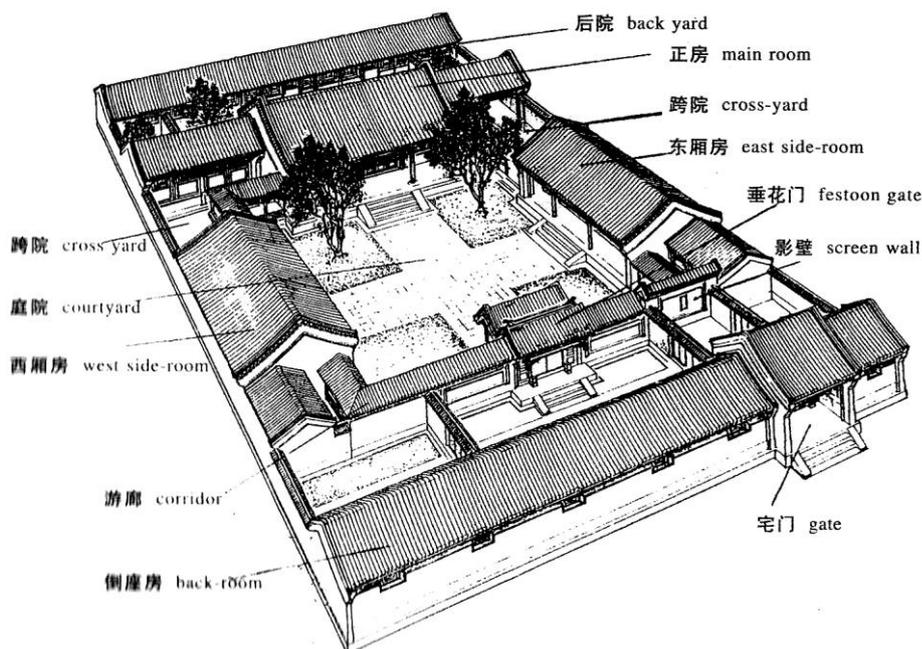


Figure 3.2.3-8. A typical Siheyuan

Source: <http://bbs.internet.org.cn/showtopic-29710.aspx>;

Fujian Tulou, firstly recorded in 1573, is a type of building in Fujian province in the south China. Although Tulou normally appears in the countryside and it therefore should not be considered as urban, we can still get some observation about the architectural culture through it. A Tulou is usually a “large, enclosed and fortified earth building, most commonly rectangular or circular in configuration, with very thick load-bearing rammed earth walls between three and five stories high and housing up to 80 families (wiki 2012, Fujian Tulou).” As can be seen in Figure 3.2.3-9 and Figure 3.2.3-10, a Tulou is indeed like a combination of Le Corbusier’s *Unité d’Habitation* and a fortress. Also, Tulous can be aggregately arranged (Figure 3.2.3-10). Life in Tulou must be quite and safe. But, even if thousands of Tulou are put together, I am not sure whether they can be viewed as a city. And, I am also skeptical on what kind of city, if they really have formed a city, it would be. But, sadly, if we only look at the type of space, too many buildings in today’s Chinese cities are somehow the descendants of Tulou.



Figure 3.2.3-9. The inside of a Tulou

Source: <http://qq.trip.elong.com/news/n002qbg5.html>;



Figure 3.2.3-10. Aggregated Tulous in Fujian

Source: <http://image.baidu.com>

In this chapter, we have reviewed the history and the cultural aspects of Chinese cities, and have introduced Hutong and Siheyuan to help understanding the traditional Chinese urban spaces. Fujian Tulou is also introduced

as a reference for the modern housing units which are commonly used in neighborhood units. The features of being scattered, self-duplication and closeness of the space of the modern Chinese cities can be somehow explained by this chapter: if they had been long accepted and favored in the past, they will as well be accepted now, as this is culture, into the bone. In Chapter 3.3, more in-depth, relevant discussions will be provided.

### 3.2.3.5 Other Reasons

There are also some other reasons to explain the phenomena in Chapter 3.2.1 and the fact that the Chinese cities are losing complexity. These are relatively less important reasons and will only be briefly mentioned in this chapter.

One reason the designers often tend to show consistent and unified design is that then they can better express themselves. The architects, who are often involved in urban planning and urban design, are especially trained to do like this. If he designs a city which has a mixed feature with some inconsistency and occasionality, that will be like a shame for him, as if he could not organize and express his ideas clearly, just like a person could not speak articulately; if he uses standardization and well maneuvers the design skills he was trained to have, he normally gets a nice work, and standardization will often strengthen the effect he wanted to express in his work. This is the arrogance of the designers and the beautiful and misleading way they advertise their works which were both criticized by Jacobs. Personally, in my career as an architecture student and as an architect, I have met so many teachers and designers who were working in a show-off way, and standardization is often an effective tool to help them expressing their ideas.

Also, from the point of view of labor, standardization saves much more time and money in both design and construction. Once a while, when I was designing a neighborhood unit during my internship in a design institute, I was clearly told that whenever possible, I should make the building units in my whole design same in order to save time.

And, another reason is that there lacks a proper understanding of the complexity of cities in both the academic field and the practical field. Jacobs started to view a city as a complex whole and proposed guidelines to facilitate the evolutions of cities as early as 1961, but the Chinese version of her 1961 work was not published until 2005. This trend of thought only spread to China nearly half a century later. Zhou stated that cities are “giant open systems with complexity” in 2002, and his work was only a general introduction on the complexity of cities as open systems and was without more specific guidelines. Looking at the Chinese planning books earlier before, they are mostly technological handbooks of different things that need to be taken into account when planning a city, and this is precisely reductionism. And, what discussed in those books was mostly about how to enhance the environment of cities—normally by providing more green fields—and how to make cities safer—normally through isolation (Li eds., 2001). The social and economic natures of cities are obviously overlooked. Fortunately, in the recent years, some scholars have started to reflect what had happened during the urbanization movement of China and are discussing better ways to develop the Chinese cities in the future (Zhang 2000, Wang and Deng 2001, Zhou 2002, Shen 2007, etc.). However, as the transfer of knowledge from academic field to practical field will need some time, the current urban planning in practice is still largely in the past way.

The above written in this chapter are the reasons of the phenomena and consequences described in Chapter 3.2.1 and Chapter 3.2.2 respectively. The reasons in this chapter are only theoretical, so the corresponding solutions we will get later can be, also, only theoretical. This should not be enough. However, the stories in real life, as will be narrated in Chapter 3.3, can be a good supplement for this chapter, and some inspirations to cope

with the urban problems of China might be found from there.

### 3.2.4 Summary

To summarize this chapter, firstly, the following phenomena could be clearly observed in today's Chinese cities: zoning is a common tool in urban planning; the size of blocks is becoming remarkably larger; the degree of standardization of buildings has become very high; there emerged many satellite cities around big cities, and there even emerged some brand-new cities. Secondly, as have been argued in Chapter 3.2.2, the above mentioned phenomena are often indicating an overall decrease of urban complexity, and the urban systems are very likely to be degrading, rather than developing. Thirdly, the reasons of those phenomena mainly include (1) the strong leadership of the government and the limited localized self-government which have caused the simple patterns of cities; (2) the hurry, simple, and duplicative way of land development and the laws and regulations that have facilitated this; (3) restrictions imposed on buildings and urban spaces from various planning and architectural laws and regulations; and (4) urban features such as being scattered, self-duplication, and closeness of the modern Chinese cities are well originated from the traditional Chinese urban spaces.

## 3.3 Stories and Inspirations

In this chapter, some stories and ordinary scenes I have personally experienced in daily life will be introduced. Like Jacobs, I am convinced that the essence of cities lies in the daily lives of ordinary people and that primary observation is an important approach to improve our understanding of cities. Hence I hope that these firsthand observations will contribute to our understanding of contemporary Chinese cities and will also imply the possible ways to deal with the current problems in cities. This chapter is composed of three sub-chapters, which respectively covers the issue of safety, of urban society, and of urban economy.

### 3.3.1 The Safety Issue

Jacobs (1961, Chapter 2 and Chapter 5) has written about the safety issue of urban streets and of neighborhood parks. She also describes sceneries she saw in the US cities, and argues on what kind of urban spaces is safe. In this chapter, I would like to, bearing Jacobs' observations and arguments in mind, tell some stories I have personally experienced in the Chinese cities in order to see whether Jacobs' thoughts apply to China.

Firstly, I have to recall some unhappy memories of myself—being robbed when I was a school boy. In total, I suffered three times of robberies, and they all happened around 2000. The stories were all similar: I and my friends, on our way home, were trapped by some elder boys and were threatened, and our money and valuable objects were taken. The amazing thing is that they all happened in or beside the same place: a park whose name is—ironically—Children's Park. The park locates in the city center and is encircled by fence. As can be seen in Figure 3.3.1-1, it only has four gates. Point A and Point B show the location of two of the robberies, and it can be found that they are all far away from the gates. When we were trapped, we had no chance to escape as the gates were far away and people passing by were very rare. Obviously, those robbers were also aware of this and that is why they chose that kind of place for their actions. There was no way we could escape and our only choice was to give our money—although just several dollars. Another time, the robbery happened at Point C which was right beside the border of the park, a kind of space called by Jacobs as "border vacuum". Although Point C is in the city center and is only one hundred meters away from an arterial road, it was very quiet as it was along the border vacuum. The robbers easily took us away from the empty street into the courtyard of a building which was also very quiet. Again expecting no passers-by to save us or to call the police, we had to give our money obediently.

Here it can be found that the spatial feature was providing convenience for their offenses. The places where these robberies happened should not be considered as random, as in the hundreds of times we walked along other streets which were with other passers-by, we never met this kind of offense.

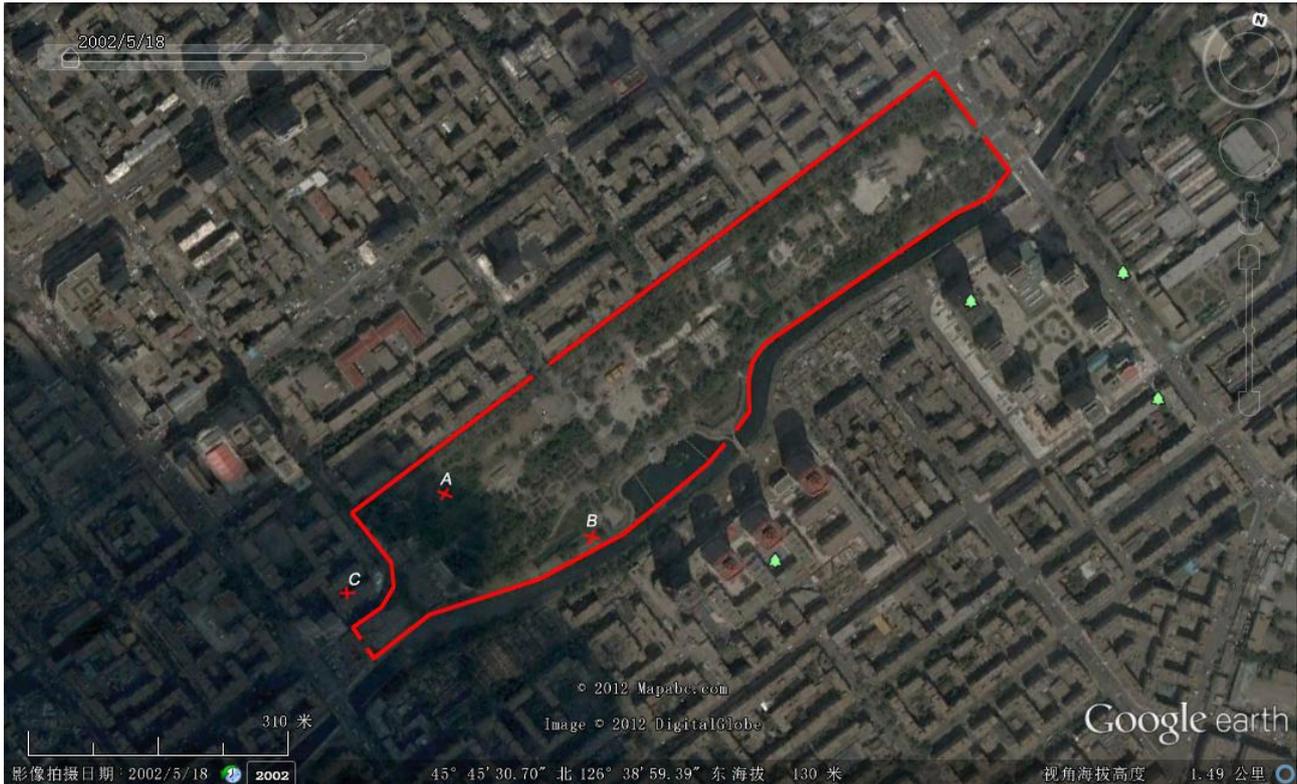


Figure 3.3.1-1. The map of Children's Park in 2012, Harbin

Source: Adapted from Google Maps 2012

Another story was recent in 2010 when I was in Beijing. I once visited Huilongguan (introduced in Chapter 3.2.1.4 of this thesis) in the evening. I was astonished when I looked outside from the window of the taxi: the buildings were so many—the dense neighborhood units, but the pedestrians on the streets were so few. Only when the taxi was passing by the gates of the neighborhood units or was running along the several commercial streets could I see some pedestrians. Later, I had a short walk along the empty streets by myself. I could clearly feel that those streets were forsaken; their safety can only be guaranteed by luck and occasionally passed-by patrols. Buildings were just along the streets, but there were bushes and trees to cut off the eyes on the streets, and there were fences or walls to protect the buildings inside and to forsake the streets outside.

So far it can be seen that Jacobs' thoughts that parks without users, streets without eyes on them, and border vacuums are unsafe can also be tested in China.

Now I would like to talk about some other sceneries. According to the orthodox planning theories and the mainstream view of planning in China, informalities in cities are just the part of city that is not yet included into the formal and decent development plans. The informal businesses are just providing low-quality services and dirty foods and leaving rubbishes on the streets, bringing shame to the cities that should have been impeccable. And, as informality normally looks like a mess, this gives people's mind a correlation of "out of order", and "out of order" gives a further correlation of crime. Then, the deduction is that informality brings about unsafeness. However, I have personally visited the urban villages in Beijing many times, and I found there quite safe. Except that they were not so neat and that the noises in peak hours of day were louder due to relatively denser residents, there was no problem with regard to safety. The reason should be that it is hard to imagine anyone would ever choose to commit crime when so many people are around.

And informalities can also extend safety out of their own territories to the formal part of cities. Figure 3.3.1-2

shows two mid-night snack peddlers in Shanghai at a crossroads. The picture was taken at 01:00, and the time they ended their business was around 03:00 as I observed. They were running their businesses in front of a 24-hour shop. When I was in that situation, I could so deeply feel that how much the two peddlers, together with the 24-hour shop, contributed to the safety of the street in midnight. The 24-hour shop is somehow defensive, and is therefore safer, but the range it covers is not so far. The two peddlers, then, based on the “safe field” generated by the shop, run their business in the open space and the influence of their business was therefore reaching much farther. This area was so conspicuous in the dark night that it could be seen hundreds of meters away. Then, all the streets inside the visual reach of this “midnight island” were becoming safer.



Figure 3.3.1-2. Mid-night snack peddlers in Shanghai (picture took in 01:00, 07 Nov 2012)

Source: Author

What have a similar effect with the informal businesses are the low-end formal businesses. Figure 3.3.1-3 shows a 24-hour noodle restaurant in Shanghai. I ate there several times in midnight, and it was always full of customers. The light it gives in dark night and the slight noise (of course, the noise is far away from disturbing the near-by residents) which can be heard from outside are all showing one thing: the city is awake; it is living. The farther house which is alight in Figure 3.3.1-3 is a fruit shop which normally opens until around 02:00 in the night, and sometimes it even opens 24 hours of day as the shop owners can take turns to take care of the shop. Putting one into the picture, he will strongly feel that the businesses in midnight are playing such a positive role in maintaining the safety of the street. In the opposite side of the street were neighborhood units; they were quietly in dark in the night, and were obviously not contributing to take care of the streets. But it is OK here, as the passage of street that was not looked after by the sleeping neighborhood units could get supervision, and thus safety, from the other side of the street which was alive.



Figure 3.3.1-3. A 24-hour noodle restaurant in Shanghai (picture took in 00:00, 11 Nov 2012)

Source: Author

Although there are also high end businesses that are open 24 hours of day such as hotels and baths, they do not contribute much to the midnight safety of the cities. The reason is that, for the hotels, the guests are mostly asleep in the night and, for the baths, the buildings are normally quite closed to the streets as the kind of service they provide is private. Also, there is not so many night clubs that could gather young people in front of their gates all night as are commonly seen in Europe, because the night club culture in China is still weak. As a result, the informal businesses and low-end businesses are normally what are still awake in the night in China. The reason behind this is that, in China, people who have to work until very late normally do not earn much, and the small or informal restaurants are right the places they could go. And, what can be seen in this chapter is that they, both the shops and the night people, are contributing much to the midnight safety of the cities.

### 3.3.2 The Social Issue

As have been argued thousands of times by many that the urban societies are the essence of cities, and the urban spaces are to support the social activities in cities. Mumford (1937) have written an excellent statement which has already been quoted in Chapter 2.3 of this thesis, and I shall quote it here again as a reminder: “the physical organization of the city may deflate this drama or make it frustrate; or it may, through the deliberate efforts of art, politics, and education, make the drama more richly significant, as a stage-set, well-designed, intensifies and underlines the gestures of the actors and the action of the play.” The phrasing is so beautiful, but Jacobs has pointed out that Mumford might have many wrong ideas about what kind of space will meet what he himself had written. In this chapter, I will describe some common sceneries and stories about the social activities in the Chinese cities.

Firstly, I would like to talk about the neighborhood units. When I was in Beijing in 2010, I rent a room in a neighborhood unit. Right outside my window was a typical green field in between rows of buildings. What impressed me was that, but not surprisingly, the emptiness of the green field. I could hardly see more than 3 users at a same time. And, people do not often talk with the others, as they normally do not know each other. Taking myself as an example, except my two flat mates who share the same suit of house with me, I knew nobody else, even my next-door neighbor. There also was no occasion for me to know the others, as we were only living in there and there was no local public life. The places supposed to accommodate public lives were

empty in most of the time, and in the limited time when there were some users of a place, they rarely talked with new people. I could remember another time when I visited a friend who was living in another neighborhood unit; we went out for a walk in the evening all the way to the central square of that neighborhood unit. That day, we met a lot people on our way and in the square, but we did not say hello to anyone as we did not know anyone. Now when I recall that scenery that there were so many strangers around us but were not talking to each other, I feel it so lonely and wired.

Why? The reason is, I think, that all people do in the neighborhood units is just to live there. They do not share many same activities due to the single primary use of neighborhood units, so there is no trigger for them to get to know each other: it is awkward for two strangers just to stop and to try to find a topic to talk. My personal experience is that when I was idling, I rarely made new friends, but when I was doing something, I often made new friends who were doing the same thing. For example, I made many new friends through doing sports together. Then, looking at the modern neighborhood units in China, natural activities that can be shared by the local residents are extremely inadequate. They work outside, go to restaurants and supermarkets outside, and do many other things outside. Sport is probably the only effective activity to make people meet, but its range is very limited—mostly for the youngsters. In total, the life inside neighborhood units is quite monotonous. The imagined “circulation inside neighborhood units (Perry 1929)” is just a myth.

Also, neighborhood units are extremely unfriendly to the outsiders, as one aim of their design is to prevent through traffic. This excludes the strangers who are a useful resource for big cities (Jacobs 1961), but in China, neighborhood units are just very popular. And, this kind of stranger-unfriendly space is also commonly seen in the traditional Chinese urban spaces. As have been mentioned in Chapter 3.2.3.4 of this thesis, it is Hutong. Next, I would like to tell a story about Hutong.

It was in Oct. 2009, at an old block which was mainly composed of Hutongs (please also refer to Figure 3.2.3-7 to see the spatial features of Hutong) near Yonghegong in Beijing. As is shown in Figure 3.3.2-1, I wanted to go from Point A to Point B. I had a city map in my hand, and it indicated the green route which was the arterial roads. The map did not include more details inside the block, but I wanted to go a shortcut route inside the block from Point A to Point B. I thought there must be a way through inside. But soon I found myself wrong; my trouble began. The roads inside were narrow and meandering, and many were dead-end roads. It was like a big labyrinth.



Figure 3.3.2-1. A block of Hutongs near Yonghegong, Beijing (the red lines are Hutongs)

Source: Adapted from Google Maps 2012.

I soon lost my way, and I wanted to ask the way. It was impossible to ask those who were in the houses, as the houses were quite closed, like saying “no disturbance”. And I waited long until a person passed by—the

pedestrians were rare (by the way, what does this mean?). I asked him how I could arrive at Point B. He was a local, but he had to think hard for around ten seconds and then told me the way. Listening to his answer, I realized that he was suggesting me to get to the arterial road first—the green route in Figure 3.3.2-1—and then everything would become easy. I was disappointed, as I thought a local would tell me a shortcut, but no—maybe there was not a shortcut at all.

I thanked him and continued my way. I did not follow his advice because I still wanted to try my luck. I walked fast for nearly another kilometer, and eventually I gave up. I managed to get onto the arterial road, dejectedly, and walked to Point B. I think at one moment I was quite close to the arterial road Point B was on, as I could clearly hear the sound of busy traffic and could see the tall street lamps, but I just could not get there. Sometimes it was a fenced yard, sometimes it was a row of houses—they blocked me.

Arguably, it was like I deserved it as I intruded into a private area. I just wanted to pass through, but the rule is: strangers unwelcomed! This is how the Hutongs are like. Some may wonder that such kind of roads must also be inconvenient for the locals. I observed more Hutongs and found that, actually, in most of the time, there are ways to different directions, only that you have to be very familiar with it, e.g. you are a local. And sometimes a yard, surrounded by several families, is linked with two roads, and the families inside the yard could go both sides to different directions. This means that some spaces are only meant to give convenience to the locals.

So far, it can be seen that, not only in the newly built neighborhood units, in the traditional blocks (Hutongs), social activities are also not encouraged by the spatial features. The effects of this situation have been argued many times earlier in this thesis (in Chapter 2.1 and Chapter 2.4), and this chapter just means to prove the existence of this situation in today's Chinese cities.

At last, I would like to write about two things in the informal areas of cities. The first one is about the urban village in Beijing. When I lived in a neighborhood unit in Beijing in 2010, one thing I enjoyed a lot was to go to an urban village nearby for the restaurants and the small shops. One evening, when I was eating my roast at an outdoor table, in less than one hour's time, I saw such an energetic life. Some saw their friends having supper at a table and joined them; a shop owner was chatting with his customer (obviously it was a frequent customer); some just sat together beside the road and was drinking some beers: these activities are quite similar with those described by Jacobs (1961, Chapter 1) in North End. All these activities in that urban village looked natural, as these people were doing some same thing or they met each other when they were doing a same thing and started some follow-up activities; they were not like being simply put in a central garden inside a neighborhood unit and were supposed to become friends. Also, as the urban villages have nearly all necessary businesses, it is a typical mixed uses, and these mixed uses will facilitate the contacts among people.

Also, although the houses in urban villages are dense, the road networks are leading to everywhere. If there is a need for connection, there will be a road—although often just a narrow lane to save land. Even for an outsider like me, I felt quite easy to go everywhere in the urban villages. Why the road networks in urban villages are built not to be like those roads in the traditional Hutongs? The reason is probably that the consciousness of defense—the refusal to strangers—are not so strong. Actually many strangers are supporting the economy in the urban villages, just like Jacobs has argued that strangers are a resource for big cities.

As have been argued in Chapter 3.3.1, informal businesses can bring about safety to cities; they can as well bring about social activities into the formal part of cities. In my college time, there was an open barbeque stall. It was not the tastiest or the cheapest. It was just the nearest, and with open seats. In summer, it was such a popular place. Going there to eat something had almost become a daily routine for me and my friends. We just had some drinks, chat with each other and also with the stall runner, and also with other colleagues we knew before. It was indeed a nice social place, and the other bigger but indoor restaurants nearby could not bear such a function at

all. The type of space of the stall, its location and its open seats, makes people feel comfortable, as if being in an outdoor party. The flexibility of the way people consume, either just taking the food away immediately or sitting down and eat for two hours, also facilitates people's use of it. In sum, except that it was not so tasty and not so clean, it was a perfect place.

So, here it can be seen that in the modern Chinese cities, informal businesses are often naturally providing nice spaces for people's social activities.

### **3.3.3 The Economic Issue**

Jacobs (1961) has talked about the importance of diversity for a healthy urban economy. It needs to be clarified that the diversity here is local diversity, as even a totally zoned city is with diversity on the whole city's level. The economic significance of local diversity is that people could easily find most things they need right around their homes; they do not need to go far away to find them. Jacobs (1961) has proposed four conditions for urban diversity which are mixed primary uses, small blocks, aged buildings, and concentration. She also argues the harm on urban economy if these conditions are missing. In this chapter, I would like to write about the situation in Chinese cities through my own experience and observation.

Here is one question first: what is urban economy? For a simple example, when one is hungry and wants to go for meal, if there are restaurants nearby, both expensive ones and cheap ones and different cuisines so that he can freely choose by his will, and he has the meal, this is urban economy. If there are only a few restaurants or the restaurants are all cheap ones or all expensive ones, the situation is somehow problematic, normally due to monopoly or underdevelopment of that area. But at least there are restaurants which mean that there is some urban economy, so it is still OK. When there is no restaurant at all (instead, very likely, there are beautiful green fields that h cannot eat) and the hungry man has to cook instant noodle at home, this is not urban economy. This is the importance of local economy which is to provide people's daily needs right within their reach and, further, to provide things beyond people's daily needs that will drag people out of their homes to use these.

However, looking at the Chinese cities, local economies are often in poor conditions, as they are deliberately restrained as a purpose of neighborhood units. Figure 3.3.3-1 shows the area I lived in Beijing in 2010. I lived in a room inside a neighborhood unit. It can be seen that the local supermarket and the formal food market are all a distance away from my home. Also, all the restaurants I could find, except a very expensive one, were in the urban village. These are very inconvenient for me, as I am lazy. I feel reluctant to go far away to buy things and would rather stay at home as long as my need is not very urgent. I guess many people are similar with me on this habit. Sometimes, even the restaurant is just 200 meters away, people are lazy enough not to go. Then, staying at home is not urban economy. This is why the local part of urban economy is important. A myth in orthodox planning is that people would be happy to kick the shops and restaurants far away because otherwise they disturb people's lives. At least for me, I would rather to have them close to my home and to bear the disturbance of their slight noise. Sometimes the shops and restaurants are kicked away by man-made regulations; sometimes the features and prices of spaces created by neighborhood units do not give chances for those businesses to survive.

On another hand, the designated places to serve the local residents are running in poor conditions. The local supermarket was OK, as it was near to two neighborhood units and was in a group of other businesses. The formal food market, which has a relatively poor location, was indeed in a dismal atmosphere, which made me even more unwilling to go there.



Figure 3.3.3-1. Map of the area the author lived in Beijing in 2010

Source: Adapted from Google Maps 2012

Now it can be seen that spaces in neighborhood units are not enough to support a healthy urban economy. The residents are not getting enough convenience, and the designated businesses are not running well due to inadequate users. Then, the next question is, in what way the above situation can be improved?

One way might be through the temporary informal businesses. As can be seen in Figure 3.3.3-1, the area encircled by green line was an informal market along West Shucun Second Road. It was on a quiet road, but was close to NongDa South road a busy arterial road. And, it was in between two neighborhood units and was close to their gates. These have all made that place perfect for an informal market. From afternoon until evening of some days, peddlers selling different things would naturally aggregate, and then a market was formed. They were selling foods, clothes, books, and all other daily needs. I enjoyed that market a lot, not only because it was closer to my home, but also because of its comfortable atmosphere: so many people were there; some were choosing what they needed while some others were without special target and were just looking around to see what they would need—shopping is a big fun on itself, much more funny than staying at home, especially when the market was so easy to reach!

However, as I said, this market with so strong vitality was only there “in some days”, as in some other days it would be banned by the police, and the reasons were that “it was not planned” and that “it would harm the urban environment”! These reasons are so ridiculous. The fact that an unplanned market was so successful had just proved that the plan was problematic and it needed adjustment. About the environment problem, it looks like that in the police’s logic, a visual environment is more important than people’s convenience. What was more, if managed well, such a market could actually well coexist with the urban environment.

This kind of informal businesses can be seen in every Chinese city I have visited—in every place where the peddlers could make money. I do believe that informal businesses contribute a lot to urban economy—at least they are a supplement. This is what is called “adaptation” by Holland, which is an essence for CAS like cities. As long as people are using the informal businesses, their existence is reasonable. In the myth in orthodox planning theories, this kind of uncontrolled businesses should be replaced by those better, designated shops and markets. However, as the aforementioned informal market indicates, and as too many other similar examples indicate, when the formal markets are already built up, still many people are using the informal ones. This indicates that,

even suppose that there bound to be more formality and less informality as a society is more and more organized through its development, in a certain stage of development, informal businesses are still needed. What was more, this, in theory, causes no harm: as informal businesses are highly flexible, when people no longer need them, they will disappear by themselves.

Another way might be, as Jacobs has argued (1961, Chapter 10), to preserve more aged buildings. Buildings at the same location but with different ages will have different prices, and they can therefore be occupied by people with different incomes and businesses with different profits. This facilitates a mixed economy which normally runs better. Actually, what Jacobs really means is to preserve some cheap buildings. Therefore, in today's Chinese cities, not only the aged buildings, the informal buildings should also be put into the same category, and here they will be collectively called as "cheap buildings".

Firstly, cheap buildings accommodate people. As we have said farewell to communism for a long time, urban people are naturally with different incomes. They are all indispensable components of the whole urban economy, and they need houses with different prices. If the low-income person could not find cheap houses, they have to leave the city, and the urban economy, especially for the developing Chinese cities, will be seriously harmed. This is one reason there should be cheap buildings. Another reason is that for the high income people, most of them were not born to be rich. In the earlier stage of their career, there was time when they could not afford expensive houses. Then, if there were cheap houses available, that would relieve their financial pressure in the early days. As I know, my once office head, a successful architect, used to live in an urban village in Beijing when he just came to Beijing for luck, and I am sure there must be many similar cases.

Secondly, cheap buildings accommodate businesses. This has also been argued by Jacobs (1961, Chapter 10) in very detail, and has been quoted in Chapter 2.1.2 of this thesis. The reason is similar: those less profitable businesses are also needed by the city and the successful businesses also had days when they were small and poor. Then, I would like to add a story I experienced.

It was in Mar. 2010, again when I was living in the neighborhood unit in Beijing. Something was wrong with my desk lamp: one of its screws was worn out, and I needed a new one to replace. I started to look for a hardware store, but did not find any one around for many days. Until one day, I went to a laundry shop to wash my clothes, and I asked the laundry lady in passing whether she knew a hardware house. She answered: "no, you have to take a bus for several stations even for the nearest one."

*"That's troublesome", I said, "maybe I'll go another day".*

*"There was one before, just opposite this street. But then they (the developers) built new houses there, and that hardware house left".*

*I suddenly realized that that was right the thing Jacobs had written about, so I asked: "Really? Do you know them?"*

*"Yes", she said, "they visited me once after they left. They moved to a cheaper building. They said they could no longer maintain their business here. New buildings are too expensive."*

*"How much is your rent?"*

*"My shop is 60 m<sup>2</sup>, the rent is 60000 Yuan (7000 EUR) per year."*

Later, I calculated that the monthly rent was 5000 Yuan. If she and her husband earn 10 Yuan per cloth and wash 1000 clothes per month, their family income per month would be 5000 Yuan. This is lower than average in Beijing at that time. They could only manage to maintain their life. But for a hardware house which is obviously less profitable than a laundry, there is no way it can survive under the rent of the new buildings—it has to leave. Then, the diversity in this area had reduced one in number. I could not fix my desk lamp, and I am sure many other people nearby were having other problems that could have been solved by a hardware house. Then, just

like me, they had to leave their problems unsolved until they eventually had time to go to another hardware house much farther away.

Now it can be seen how the cheap buildings are contributing to the urban economy. Actually, in many places, the newly built buildings are underused while the old, cheap buildings are quite fully used. One example is what I observed in Shanghai in Nov. 2012. Quxi Road is in the inner city of Shanghai, and as is shown in Figure 3.3.3-2, A and B are two buildings along Quxi Road. Building A is a new tower building. Obviously it is expensive. However, its first floor designed for commercial use, in good condition, was not in rent. Meanwhile, all the first floors of the older buildings nearby were rent out. A room in Building B was even in double-rent. In daytime, it was a steam-bread shop, and in nighttime it was a barbecue stall, running respectively by two families. From this story, it can be seen that how intensely the old buildings are used while some new buildings are still looking for their positions under gloomy efforts.



Figure 3.3.3-2. Area near Quxi Road, Shanghai, 2012

Source: Adapted from Google Maps 2012

In this chapter, it can be seen that while some new buildings are not being fully involved into the system of urban economy, the informal businesses could often find their positions and perform. Informal businesses are like lubricants for those areas whose economies are problematic mainly due to simple and often zoned plans. Also, cheap buildings are indispensable for some people and businesses that are a part of the whole urban economy, and they are often more intensely used. Therefore, how to preserve the aged buildings is a big problem. If done well, the preservation of aged buildings can facilitate a better urban economy. More in-depth discussions will be made in Chapter 3.4.3 of this thesis.

### 3.3.4 Summary

To summarize this chapter, it could firstly be found that in the urban areas guided under orthodox planning theories, many places, e.g. in and around the gated parks and the streets along the gated neighborhood units, are unsafe, while urban informalities have contributed much to the urban safety. Secondly, social activities in both the newly built neighborhood units and the traditional blocks (Hutongs) are not encouraged by the spatial features there, while there often seems to have better social activities in the informal areas of cities and the informal businesses in formal part of cities. Thirdly, informal businesses and aged buildings are important for urban economy.

### 3.4 Suggestions for Reform: How to Regain Spatial Complexity

So far, we have seen the phenomena and their consequences in today's Chinese cities, have analyzed their reasons from multiple aspects, and have gone through more concrete stories and sceneries to build up a better understanding and to seek inspirations. Now in this chapter, it is time to propose suggestions on how to enhance the situations of the Chinese cities. Jacobs' thoughts (1961) are a set of consistent ideas. An easy way is to transfer her thoughts to China and to analyze their possible degree of applicability, and that will be Chapter 3.4.1. However, as her thoughts were born in the US context in half a century ago, there must be many suggestions more than Jacobs' thoughts for the Chinese cities today. Therefore, suggestions especially under the Chinese context will be then discussed in between Chapter 3.4.2 and Chapter 3.4.4, largely corresponding to the reasons analyzed in Chapter 3.2.3.

#### 3.4.1 Applicability of Jacobs' Thoughts in China—Are They Transferable?

To summarize Jacobs' thoughts, there is an important concept for cities which is localized self-government. In her frame of concepts, this is a prerequisite for the running of urban systems. Then, she has proposed four conditions for city diversity: mixed primary uses, small blocks, aged buildings, and concentration. These four conditions can be viewed as general guidelines for normal big cities and they are largely transferable to Chinese cities, and their applicability to Chinese cities will be the main concern of this chapter. Then, she has discussed some more specific issues in the running of urban systems and has discussed the effects of different tactics with regard to the slum problem, automobiles, visual order of cities, etc. These are useful references, but they are closely intertwined with their US context and are therefore not so easily to be transplanted to China, so they will not be transplanted altogether but will only be individually referred to in the later chapters where necessary.

Localized self-government is the spirit of Jacobs' thoughts. All the appreciated sceneries in her cities, in essence, origin from localized self-government, and the top-down administrative powers and guidelines seem to be often causing monotonous and ill-operating cities. But of course, the top-down power has its reason for being, as have been argued in Chapter 2.3.1 of this thesis that the human society has its part of a, although never a complete one, meta-organism. It is actually a problem of looking for the best point to balance the bottom-up mechanism and the top-down power. And, given the social nature of localized self-government, there should never be a perfect point which is universal or a calculable optimum value of any indicator. The most reliable account might be, as many as possible, the observations and experiences, and they should be decided on a case-to-case basis.

In the US context, the self-government issue can be openly discussed and advocated, while in China, this is not as simple as that. In a country that had been ruled by feudal dynasties for long, that had been shortly but intensively ruled namely by communism but actually largely by totalitarianism, and that is still being ruled by authoritarianism, self-government is somehow in conflict with the ideology both in the traditional culture and in the current Constitution. Fortunately, as far as my observation, the trend of self-government in the Chinese society was allowed to grow in these years, and the consequently achievements will obviously benefit the urban developments in China. This issue on itself is worth an in-depth study, but I feel it beyond the reach of this thesis. Also, localized self-government is not so instantly related with the spatial features of cities. So, these have made me decide to leave this argument open, and to move to the more concrete parts of Jacobs' thoughts.

Mixed primary uses can be facilitated directly through policy making and amending those architectural and planning laws and regulations. An obstacle is people's prejudice on mixed uses, and prejudices could be removed through arguing and facts. Anyway, it is realizable in many ways, and what needs to be done is to facilitate its happening. More discussions will be made respectively in the following chapters. And, it needs to be pointed out

that mixed uses will indeed also bring about disturbance to the residents, for example a noisy club in the night or a dirty backyard of the kitchen of a restaurant. Then, such problems need to be noticed and solved by means of technology and management.

Small blocks are also possible to be realized through multiple ways such as the making of policies and of architectural and planning laws and regulations. Through preserving the old houses, many small blocks will be naturally maintained. Also, alternative ways other than the super blocks which are mainly caused by neighborhood units should be developed. Relative discussions will come in the following chapters.

The preservation of aged buildings, too, can be realized through the above mentioned ways. It is, on one hand, often making small blocks and, on another hand, reducing the total amount of construction. For an area where buildings in different ages are intermingled and those that worth preservation are forming an irregular pattern of land, both management and design will be much more complicated. But still it is possible under management and design with higher quality. The point is that, if cities should be like this, there is no other way we should follow except facing the challenges and finally overcoming them.

With regard to concentration, people's deep rooted hatred toward it should be removed first. It should be clarified that people do not hate concentration so much; what they hate are the low qualities of environment, and concentration often brings about low-quality environments as the difficulty of management, mainly of providing adequate municipal services, is higher. Then, this is a problem of improving the quality of municipal services, but not of blaming concentration. As have been argued by Jacobs (1961), concentration is a resource for urban economy. It is only that the negative part of concentration should be overcome.

So far, it can be seen that Jacobs' four conditions of generating urban diversity are all possible to be transferred onto the Chinese cities. In the following chapters, suggestions especially for the Chinese cities, from different aspects, will be given.

### **3.4.2 About Governance**

As have been argued in Chapter 3.4.1 that localized self-government is an important point in Jacobs' ideal of cities. And as have been argued in Chapter 3.2.3.1 that in the development of Chinese cities today, the interference from the government is very strong while the localized self-government is very limited. The role of the government is too strong, and other actors, especially the ordinary people, are too weak. Therefore, it is necessary to involve more actors in. This can be done through consciously encouraging those small actors to take part into the whole process of the urban projects, and can also be done through tolerating the self-organized constructions on the bottom level.

As have been mentioned above that the development of land is normally pushed by the government, but the government is unable to work on all the lands at the same time. When an area is temporarily out of the reach of the government, still the situation of that area should be investigated and analyzed by the government. The government should be aware of what are happening in the informal areas of the city and of the mechanisms of the informal urban lives, and the government should try to coordinate their long-term plan with the mechanisms of informalities.

Also, when possible, the government should inform the informal dwellers when their lands are planned to be reformed. Now the government would only inform the dwellers less than one year in prior. This period of time is only enough to do the negotiation on compensations. Before that, the local residents would not know anything about the future of the land they are living on. Informing the residents is important, as this would give them a

clear anticipation of the future so that they would make proper investment according to the anticipation and their own situations, instead of always maintaining their standard of life on the lowest acceptable level due to the fear that the area will be developed tomorrow and their investment today is totally wasted, as is shown in Figure 3.2.3-5. Then, their status of life would be obviously more positive.

Actually, it is very likely that what the government should do as suggested above are all secretly undergoing. The government is aware of everything, but it does not open the information so that things are manipulated by the government at the back stage. This is actually a problem of the openness of the government, and it relies on the pressure from the people on the government and the government's self-awareness of improving itself. It takes time until the government becomes better. We are still on the way with expectations for a better situation.

### 3.4.3 About Policy Making

As have been argued in Chapter 3.2.3.2, the governments love to sell more lands to gain more income, and they tend to sell the lands in big pieces as it is easier to do. Then, neighborhood units are built up and super blocks are formed.

However, as have been argued in Chapter 3.3.3, the self-organized economic activities will naturally lead the cities to a higher degree of complexity which is mostly missing in the designed, zoned cities filled in with many neighborhood units. Presently, in the Chinese cities, the self-organized economies, i.e. informal businesses, and voluntary social activities are not adequately supported by the urban management and urban spaces, while they are an important part of urban lives. Therefore, with regard to policies, the informal businesses, and also those low-end businesses, should be more tolerated, and there should also be cheap buildings to support them. However, cheap buildings are never the newly built buildings. If an area is filled up all with new and expensive buildings, its complexity will be killed. The only feasible way is to preserve enough old buildings. After this, the income by selling land is reduced and the urbanization seems to be incomplete or decelerated, but a mixed economy and a healthy urban mechanism are facilitated. Even though there are tower buildings high above the ground, there are still real urban lives guaranteed by the old houses on the ground.

It is recommendable that the development of a big piece of land should be timely staggered. The big land should be cut into smaller pieces if possible, and the developments of smaller pieces should be in different time. Suppose the necessary time to develop a place is 2 years, and an area that should be developed in one time is instead to be developed in four stages, then the whole process would be 8 years. In all the 8 years, there are always cheap buildings in this area to hold the informal businesses and low-end businesses, and the local economy would therefore be all right. At the same time, the longer period is also a period to wait for the new businesses to emerge: when 8 years have passed and this area is fully developed, the buildings in the first stage will be already 6 years old, and expectedly they will have already been well used. Also, the price of the 6-year-old buildings will be a bit cheaper than the buildings that are just finished, and this is what described by Jacobs (1961) as "the economy of time". The 6-year-old buildings should have already had businesses that are intertwined with other businesses around this area, and they together will form a complex economy. This economy will support the whole area when the new buildings are just finished and the economies in there have not yet emerged.

And, in the earlier stages, we could also observe to what degree the economy of this area relies on the old buildings. If the reliance is high, more old buildings should be preserved in the follow-up development; if low, which means that the new buildings have already found their role in the whole local economy, then more old buildings can be removed. To sum, to slow down the speed of development of an area and to develop it in stages could, firstly, always maintain some old buildings and bring about a mixed and healthy economy and could, secondly, leave some leeway for better strategies in the future which will remedy the problems to be emerged in

the early stages.

To be more specific, what kind of old buildings should be removed and what kind should not be? This should be decided by the economic status of the residents living in the buildings. If they only have poor jobs or, even, they do not have jobs at all and are relying on the very basic social welfare, then this kind of old buildings are removable from the point of view of economy. Through compensating the poor residents with new houses or money, as is required by the current land policy in China, it is actually a kind of social welfare for them. However, if the residents are running their own businesses and the businesses look both sustainable and profitable, it would be unwise to remove their houses only with the reason that their businesses look not so decent. If their businesses are forced to stop and they are provided new houses in neighborhood units, as a commonly practiced way recently, the new situation, from an economic point of view, might not be better. In this case, the primary consideration should be how to preserve their current businesses, especially when their businesses are already incorporated into the other businesses nearby. Normally, low-cost houses are an important condition, and the best way to provide low-cost houses is to preserve the old buildings.

### 3.4.4 The Planning and Architectural Norms and the Guidelines for Design

Now, to be more concrete, with regard to the planning and architectural norms and the guidelines for design, there are also some suggestions.

It needs to be clarified first that most part of the current planning and architectural norms in China are reasonable, and they are useful references in urban planning and urban design. According to the former arguments in this thesis, there are only some points not in common with the current planning and architectural norms, and they will be pointed out and discussed in this chapter. Also, as have been argued before, the current Chinese planning and architectural norms are based on reductionism, i.e. only the material aspect of cities is considered, and the norms are like simple accumulations of different elements of cities. The mechanisms of urban safety, urban society and urban economy are largely overlooked in these norms. Then, the following suggestions are to solve these problems (to make this set of suggestions complete, Jacobs' proposals will be borrowed to put into this list):

- First things first, mixed primary uses should be advocated to take the place of the old zoning laws.
- Small blocks should be encouraged, rather than the super blocks caused by neighborhood units.
- Old buildings, not only those with historical or cultural value, but also those ordinary old buildings that are able to stand longer, should be more preserved.
- Higher degree of concentration of people should be advocated to take the place of the old doctrine that dense people brings about chaos and a poor standard of life.
- With regard to sunshine spacing, the requirement on it should not be so high, and the requirement should be only on the residential buildings. For the commercial buildings, direct sunshine should not be the primary consideration. Also, a certain proportion of residential buildings should be allowed not to reach the standard of sunshine spacing; their existence can be left as a choice for the market. Then, the modified sunshine spacing would help making the patterns of buildings more compact, which benefits the development of urban society and urban economy.
- With regard to green fields, now the problem is not that they are inadequate; the problem is that they are often not fully used and are often unsafe because of this. Therefore, it should be reasonable to lower down the requirement of the amount of green fields, but to increase their quality. This will also help generating denser buildings.
- In designing an area, it should be ensured that there are people on the streets in different time of day. This could normally be realized by mixed uses.

- If, through analyzing a drafted design of a project, some areas are inevitably to be monotonous, it can be solved by adding some new streets or bending the existent streets to connect this monotonous area with some energetic areas nearby.
- With regard to the design of parks, it is favorable that the parks are surrounded by buildings with multiple functions. Through a proper design of road network, through traffic of parks, by means of walking or cycling, should be encouraged.
- It is favorable that the parks are under the eyes of people. In designing a park, analyzing the lines of sights on the parks and the lines of traffic in different time of day is necessary.
- Fenced parks should be avoided when possible, as they are less safe than the open parks, especially when the users are rare.

### **3.4.5 Summary**

To summarize this chapter, it could firstly be found that Jacobs' four conditions of generating urban diversity are all transferable to the Chinese cities. Then, better-balanced governance is suggested, e.g. involving in more actors, trying to reconcile with the urban informalities, open more information to the people, etc. The policy making should be more specified and should be more complex, aiming at a synergy of projects in different time; the preservation of aged buildings should be especially taken into account. With regard to planning and architectural norms, there are also various points to be enhanced, as have been specified in Chapter 3.4.4.

## **3.5 Summary of Chapter 3**

So far, reviewing the whole Chapter 3, phenomena such as zoning, super blocks, high degree of standardization, satellite cities and brand-new cities could be clearly observed in contemporary Chinese cities, and their consequences are generally more negative rather than positive. Reasons of these include governance reasons, the mode of land development decided by laws and policies, the paradigm of spatial design decided by planning and architectural laws and regulations, historical-cultural reasons, and some other less important reasons. In order to have a better understanding and to look for some traces of solutions, some stories and sceneries from my own life experience are told. Then, based on these, suggestions from different aspects, largely corresponding with the reasons analyzed in Chapter 3.2.3, are given in Chapter 3.4.

Now the next questions are: whether these suggestions are applicable; to what extent they can be realized; what an area would be like once these suggestions are adopted and what are the differences between the way of urban development proposed in this thesis and the mainstream way of urban development in today's China. Then, these questions are what Chapter 4 of this thesis is about.

## 4 Introduction of the Urban Design of the Inland-port of Harbin

This chapter is to answer the questions raised in the end of Chapter 3, and it is supposed to illustrate possible outcomes of the proposed suggestions in Chapter 3.4 if they were put into practice, using my own work in 2010 as a starting point. This work was not a task as required by any; it was purely out of my personal interest to enhance one of my design works in undergraduate stage. In the enhanced version, Jacobs' thoughts are applied, while in the former version, what was followed was definitely the mainstream way of urban planning in China which is, largely, orthodox planning theories. In this chapter, what will mainly be shown is the enhanced version, but in a few places, the former version will as well be shown as a comparison.

The work is the urban design of the inland-port area of Harbin. This site is located in the city center, but it was almost a forsaken land, mostly filled with slum dwellers and informal businesses. Due to its valuable location, the government had been having a clear will to reform that site for a long time. Then, this is a typical situation for today's Chinese cities: a bad land is to be reformed into a better area soon. Therefore, showing this case could provide a typical reference for many other similar cases. The current situation of the site, the strategies, the result of design, and the analysis of the design will be shown in more detail later in this Chapter. Other than these, the practicability of the design, from multiple aspects, will be analyzed in the end.

It needs to be pointed out that, because this chapter is an introduction of a design and design is different with writing works, the logical structure of this chapter will not perfectly correspond to that of the former part of this thesis—this chapter should be more viewed as an individual part. But of course, this chapter will be in consistence with the points reached in the foregoing texts. Also, rather than texts, images will play a more important role in this chapter.



Figure 3.4.5-1. The reality and the expected, inland-port of Harbin

Source: Author

### 4.1 Introduction of the Current Situation of the Site

In this chapter, Harbin, as the city the site is in, will be briefly introduced as a reference first. Then, the situation of the site will be introduced, including its location in the city, its external conditions, and its internal situation.

### 4.1.1 The City of Harbin

Harbin, by whatever definition, is a big city. It is one of the Top 20 big cities in China, and is the capital of Heilongjiang Province. Its population was 4.72 million, constructed urban area 331 Km<sup>2</sup>, and GDP per capita 5820 \$ (in 2009). Harbin is a typical big city of modern China.

There is more information about Harbin in Chapter 3.2 of this thesis, and it can be a supplement of the information of Harbin here. From there it can be found that the urban development of Harbin has been much following the mainstream way of urban development of Chinese cities.

### 4.1.2 The Location of the Site

Firstly, as can be seen in Figure 4.1.2-1, the site is located in the city center. Then, having a closer view, Figure 4.1.2-2 indicates more of the surroundings of the site. It can be seen that a university (the most important university of Harbin) is right at the side of the site, and the central train station, a commercial center of the city, and the provincial government are all within 2 Km's distance—the site indeed has a very central location, and it has easy access to many important areas of the city. To the south of the site is an arterial road, and to the north a sub-arterial road: the transportation of the site could be quite convenient. These conditions imply that the site got many advantages of being a successful urban area.

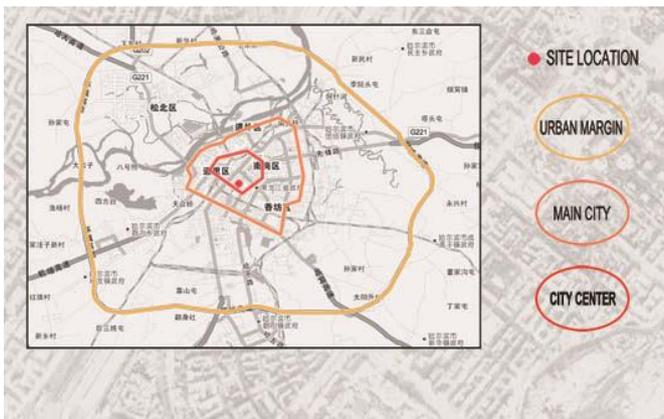


Figure 4.1.2-1. The location of the site

Source: Adapted from Google Maps 2010

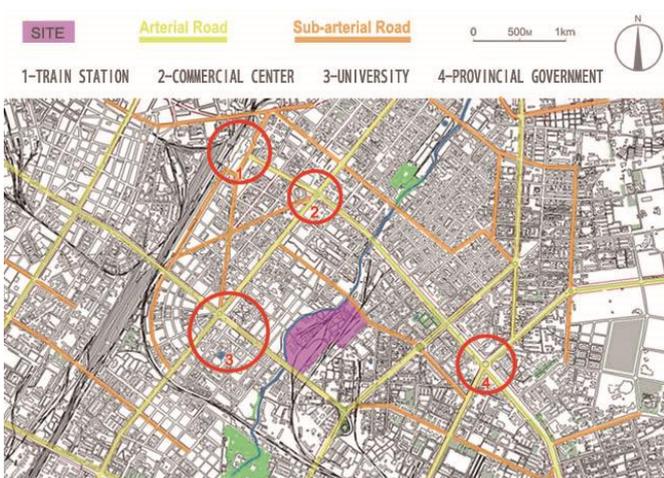


Figure 4.1.2-2. Surroundings of the site

Source: Author

### 4.1.3 The Site and Its Close Surroundings

Figure 4.1.3-1-A shows the plan of the site in 2010. Other than the two arterial roads to its north and south, the site was only connected with the outside through a small bridge. Openings along the two arterial roads into the site are limited (approximately 2 or 3), and all other borders of the site were closed toward its surroundings—probably with the purpose not to link this informal area with the decent part of city. An external street, as is shown as yellow line-and-dash combined in Figure 4.1.3-1-A, could have been connected with the site, but it was not made so (and this is why the line turns into dash in the illustration).

There were several large retail outlets for new building materials—one inside the site and two outside (as can be seen in Figure 4.1.3-1-B). Also, there was a thermal power plant right beside the site. As the function of the site before was the inland-port of the city, there were railways into the site. The black dash shows the part of railway still in use in 2010, which was transporting goods for the retail outlets and coals for the power plant (Figure 4.1.3-1-D). There were storehouses for goods and store areas for coals along the railway. As can be seen, the coals were not stored at the immediate reach of the power plant. Then, re-transportation by trucks of the coals to the power plant was needed (Figure 4.1.3-1-E), and the approximate route is shown as yellow dash in Figure 4.1.3-1-A. The reasons of this kind of inefficient transportation route are unknown, but it obviously needs to be improved.

Other than these, it can be observed that there were several areas of informal houses inside the site, together with some bigger buildings. More details about these will be provided in Chapter 4.1.4. Also, there is a river beside the site, and at the immediate other side of the river, there were residence buildings and a small area of informal houses. To the bottom side of Figure 4.1.3-1-A, beside the power plant, there were also residence buildings.

Moreover, as can be seen in Figure 4.1.3-2, the chimney of the power plant is observable from very far away from the site. It can be viewed as a natural landscape of the city: a pole or the end of an axis, etc. Now it was coincidentally at the end of a street (the aforementioned street shown as yellow line-and-dash combined), but there was no bridge along this street over the river into the site. In the future, there obviously should be such a bridge to build up the connection between the site and the external street. Then, with the visual reinforcement of the chimney, the site could be more merged into the structure of the city.



Figure 4.1.3-1. Plan of the site before reform and the functions within and nearby

Source: Picture A adapted from Google Maps 2010

Pictures B to D: Author/Picture from internet



Figure 4.1.3-2. The chimney of the power plant

Source: Author

#### 4.1.4 The Internal Conditions of the Site

In Figure 4.1.4-1, more details of the site are observable (the upper and bottom pictures in this figure corresponds with the numbered circles in the central image). The upper pictures mainly show the environment of the site and the conditions of the informal houses, and the bottom pictures mainly show the houses with

special functions and the industries inside the site. In general, the whole site was in a horrible situation: ruined buildings, poor families, and low efficiency. One can hardly imagine that there would ever be such a place in the city center.

Looking at the upper pictures first, Picture 1 shows the river. It is obviously an advantage for the site. Although the quality of water of the river was not very good, it was much better than before and was planned by the government to be further improved. The river could be a good view and attraction. However, it is also a challenge as it can as well form a border vacuum. How the river will function depends on the way how it, together with the adjacent areas, will be designed.

Picture 3, Picture 4, and Picture 9 show the impoverished informal houses. It can be seen that all the informal houses were in extremely bad conditions and they lack even the most basic infrastructures. These informal settlements were not comparable with the houses in the urban villages of Beijing, let alone the buildings in informal areas like North End. It could be asserted that the houses, even with the loosest standard, do not worth any preservation.

Picture 7 shows a house in disuse but, looking at its condition, might worth to be preserved. Picture 8a, Picture 8b, and Picture 8c show a workshop, which was also in disuse. It looked poor, but its structure was actually quite firm. If refurbished, it may well become useful. Many industrial facilities were left around the workshop: a hoist, some machines, a tower, etc.

Then, looking at the bottom pictures, Picture 2 shows the retail outlet for building materials inside the site. The retail outlet was inside the formal scheme; the building was in good condition, and the business was very good. However, it should be noted that not only the business of the big retail outlet was good; the businesses of the small shops in informal houses near the outlet were also good. They had already been merged as a whole: the big retail outlet was selling expensive materials, and the small shops the cheaper ones, and people were visiting them all. Picture 6 and Picture 11 show the facilities supporting the building material market; the former shows the hoist that tidies the containers unloaded from the train, and the latter shows the storehouses, whose structures were in fine conditions.

Picture 5 and Picture 12 show the storage areas for the coals which were occupying nearly one third of the whole site. These coals, as have been introduced in Chapter 4.1.3, were unloaded from the train first and were then transported to the power plant by trucks.

Picture 10, Picture 13a, and Picture 13b show some houses that were used for administration. These houses were in relatively better conditions, and they obviously could be reused if they are preserved.

And, as can be observed in Figure 4.1.4-2, the local informal dwellers were doing the business of recycling the used building materials. This business does not look very profitable, and it looks not so decent. However, its significances are, firstly, it is not difficult to do as it does not require high technology or intense investment and, secondly, the recycling of used building materials is related with the selling of new building materials; they are all parts of a bigger business chain.



Figure 4.1.4-1. The internal conditions of the site

Source: Author



Figure 4.1.4-2. The building material recycling business of the informal dwellers

Source: Author

## 4.1.5 Summary

To summarize this chapter, the site is located in the center of Harbin, but it was much separated from its surrounding areas. The functions of the site included building material market, goods storage and coal storage, some administration houses, and some forsaken workshops. There were also many informal dwellers in the site, and they were mainly doing the recycling of used building materials. The whole site was in a very poor situation, and only a few buildings might worth to be preserved.

## 4.2 Strategies and Considerations

In this chapter, the strategies of design will be discussed. These include the overall strategy and the sub-strategies including maintaining the original businesses of the informal dwellers, the design of a new road network, rearranging the storage places, the design of green spaces, and the design of the park of industrial remains. In the following part of this thesis, the colors of the buildings and spaces, i.e. yellow, red, orange, and green, respectively means residential buildings, commercial buildings, residential-commercial mixed buildings, and green spaces.

### 4.2.1 The Overall Strategy

The overall strategy of the design is to increase the diversity within the site. Figure 4.2.1-1 shows a comparison of a zoned city (left) and a city with diversity (right). There have already been enough argument on the two types of cities in the foregoing texts of this thesis, and diversity has been advocated.

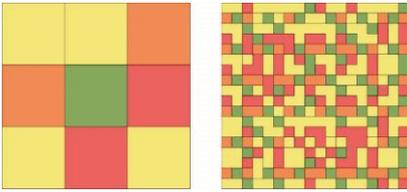


Figure 4.2.1-1. Overall strategy: increasing diversity

Source: Author

Figure 4.2.1-2 shows a mechanism of improving diversity of a city. If the city is already zoned, then any new project is a chance to add diversity. Although we could do nothing outside the given site, there is much we could do inside. If an area with diversity is built up inside the site and an urban system with strong dynamic is therefore formed, it may well be expected that the dynamic could spread to the surrounding areas, although this would be a long process. Eventually and ideally, the whole city could be “infected” with diversity throughout this way, although the process will be very long and it requires a very high quality of design and governance in as many places as possible. Anyway, adding diversity in one site would normally be positive.

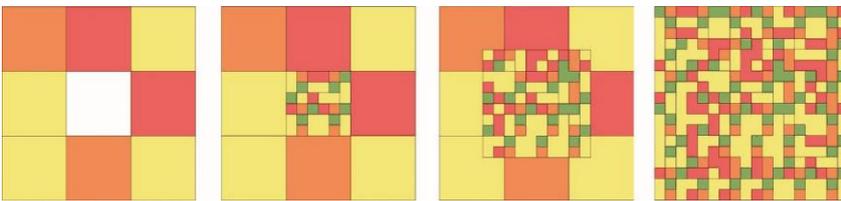


Figure 4.2.1-2. The process local diversity spreads its influence

Source: Author

## 4.2.2 Maintaining the Business of the Informal Dwellers

As mentioned before, the recycling of used building materials is well related with the selling of new materials and they together have formed a part of a business chain. The informal, recycling business was all in the poor informal houses. Of course we can simply destruct those poor houses and construct new neighborhood units. Then, it is very likely that the former informal residents will be compensated, mercifully, with houses in the neighborhood units to live in. But is that the best option? What jobs can they do to earn their lives if their former business is removed? As have been argued in Chapter 3.4.3 of this thesis, the consideration of preserving their former business is important, especially when they had a business which has already been incorporated into the urban economy. Therefore, the strategy here is to maintain the recycling business of the informal residents (Figure 4.2.2-1).

But of course, as the informal houses are too poor and they do not worth to be preserved, new houses especially for their business should be designed. The already-existed storehouses are with fine quality and can be preserved. With these considerations, the plan is: to keep the storehouses and those old administration houses, as they are cheap. Then, new, 2-floor, commercial-residential mixed houses are to be built around the storehouses to build up proximity between the selling and the storage (Figure 4.2.2-2). Then, in this kind of space, the former business of the informal dwellers could be preserved, and is even better organized and is in larger scale. Figure 4.2.2-3 shows the section of the new type of space: the first floor is the space for selling, the second floor is the living space for the family, and in the back is the storehouse that is preserved and that is shared by all the families surrounding it.

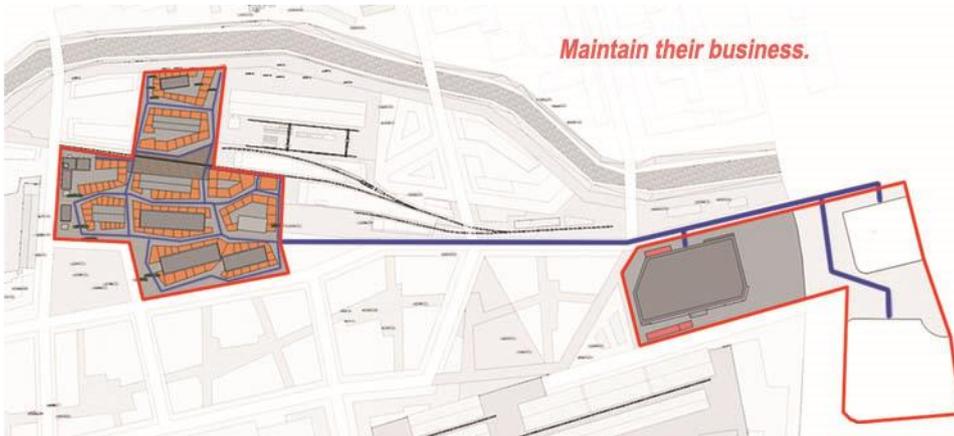


Figure 4.2.2-1. The connection of the recycling of used building materials and the selling of new building materials

Source: Author



Figure 4.2.2-2. Which old houses are kept and how the new houses are to be built up

Source: Author

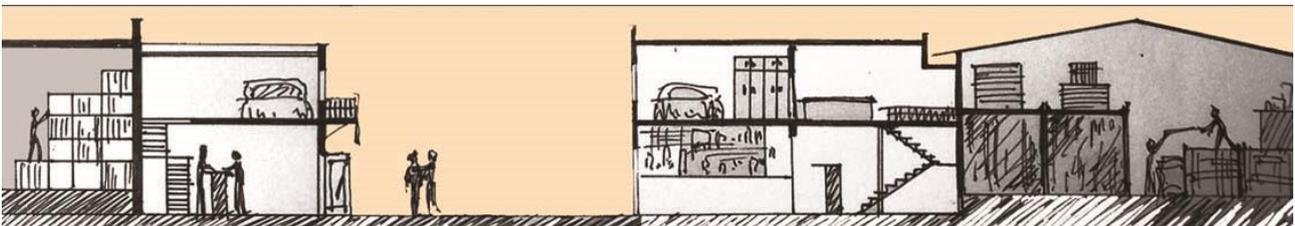


Figure 4.2.2-3. The section of the new type of space

Source: Author

### 4.2.3 The New Road Network

As argued before in Chapter 4.1.3, the site is extremely close toward the outside. It can also be seen in the left part of Figure 4.2.3-1 that the current roads were all only stretched shortly into the site and there was not such a thing as “road network”. Then, in this scheme, designing a proper road network is necessary, and that is the right part of Figure 4.2.3-1. This is like putting on the missed piece of puzzle back to the whole picture. And, as it is not the aim of this design to apply neighborhood units, through traffic of the site is much encouraged because this would facilitate a better functioning road network.

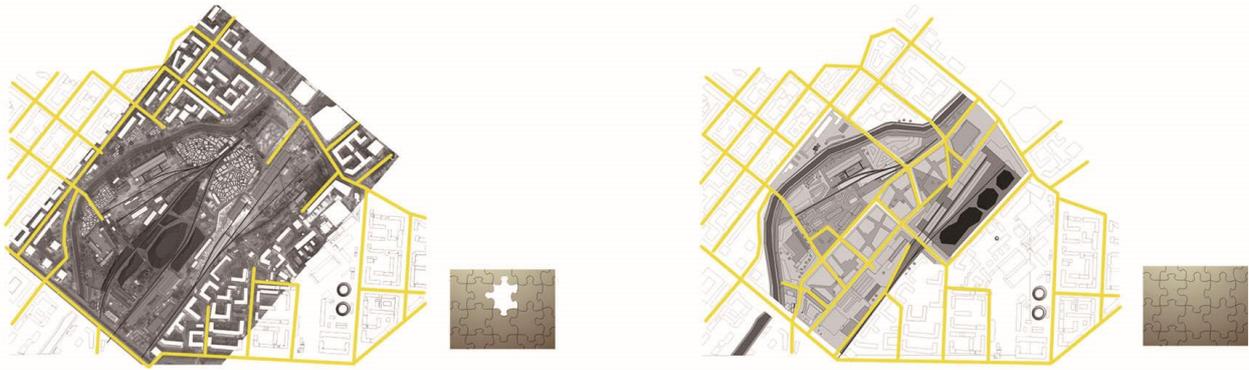


Figure 4.2.3-1. The current situation and the new road network

Source: Author

#### 4.2.4 Compacting the Storage Places

As can be observed in Figure 4.1.3-1 and Figure 4.1.4-1, the storehouses, the store areas for coals, and the informal houses were intertwined together, and the internal traffic was very unreasonable. In the reformed design, these functional areas will be compacted with the purpose to build up a more efficient internal mechanism.

Firstly, as can be seen in Figure 4.2.4-1, high-density residence houses will be constructed after the coals are moved away. The first floor of this kind of buildings fits to be as shops or other businesses. The number of floors of these buildings will be in between 3 and 6. The number of floors, together with the density of buildings, makes a high degree of concentration of people which is important for urban diversity. Actually, the yellow buildings in the right part of Figure 4.2.4-1 are only a general vision of a possible way of the distribution of the buildings. Further design will be depend on the specific demands and chances in the future.

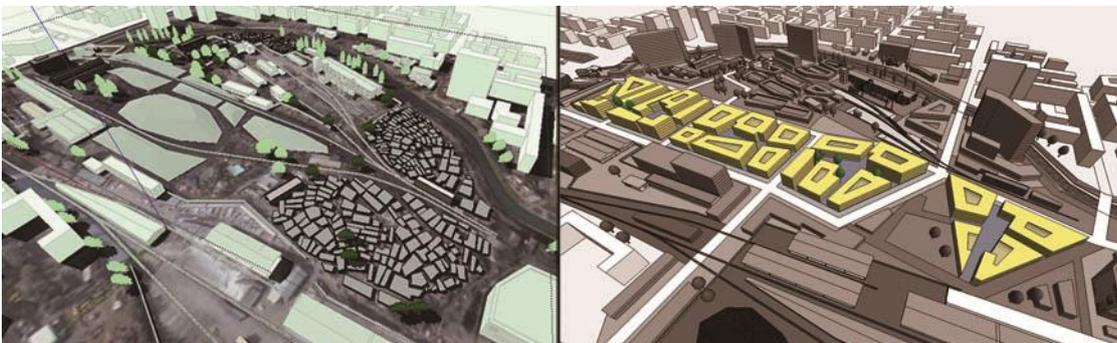


Figure 4.2.4-1. The reform of a part of the site

Source: Author

As can be seen in Figure 4.2.4-2, the storage place for coals will be moved much closer to the power plant, meanwhile still being along the railways. Some new storehouses for goods will be built up, and they will be integrated with the storage place for coals, as is shown in the right part of Figure 4.2.4-2. After this, the former functions of the site could still be preserved, but they are much more compact and efficient. There will even be some extra spaces cleared for new buildings.

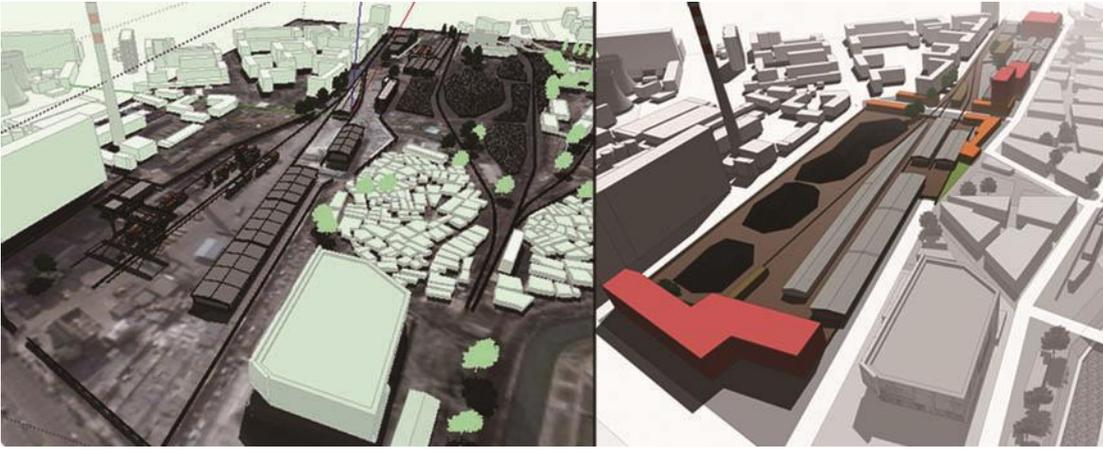


Figure 4.2.4-2. The reform of a part of the site

Source: Author

Eventually, in the new design, the coal piles are closer to the power plant and the route of re-transportation of coals is therefore much shortened. The railways are preserved and are reorganized, reducing the area they occupy while maintaining their function. In feasible places, new buildings of different uses will be built up. The whole site will simultaneously be with mixed uses and a structural order.

## 4.2.5 Network of Open Spaces and Visual Order

Figure 4.2.5-1 shows the system of open spaces of this design, but it looks quite random and it is even not like a design. However, I do not think this is a problem. The users will never care about the plan of the park. What they care about are the content and the safety of the park, and they should also have easy access to the park. If lacking these, parks will become “deprived places”, and only with these will the deprived parks get the “boon of life (Jacobs 1961, p.89)”.

As Jacobs has argued (1961), and as is cited in Chapter 2.1.1.2 of this thesis, a successful city park should be with continuous users coming from different directions and with different purposes. To achieve this, with respect to park designing, the principle is “to use parks and squares and public buildings as part of this street fabric and to use them to intensify and knit together the fabric’s complexity and multiple uses (Jacobs 1961, p.129)”.

Then, looking at the colored part of Figure 4.2.5-1, this park system has applied the above-mentioned principle. This is not a concentrated big park, but is rather a combination of green fields and public buildings which are intertwined with their surrounding buildings. The decentralized feature of the park makes it easily accessible by more buildings, and it also reduces the depth of the park, which makes the park more under the eyes of the nearby residents and is therefore safer. Other than the grey houses—a museum after reform that will be discussed later, the small houses in this picture could be restaurants, bars, small shops, etc. These concrete functions may bring about more vitality into the green spaces. Moreover, the surrounding buildings with multiple uses will also facilitate the use of the green spaces.

In the midst of the open spaces, there is the “museum of industrial remains”. Also, due to this theme museum, all the green spaces could be collectively called “the park of industrial remains”. More details about the museum will be introduced in Chapter 4.2.6 of this thesis.



Figure 4.2.5-1. The network of open spaces

Source: Author

And, although visual order is not the primary concern, it is still considered. As have been mentioned in Chapter 4.1.3 that there is a chimney which could be a visual link between without and within the site, Figure 4.2.5-2 shows a more concrete vision about how it will work. There will be a bridge to extend the external road, which points toward the chimney, into the site. All the way through that road, people will keep a visual contact with the chimney, and the chimney is therefore a visual end. And, at the end of the road, in front of the storage area and a certain distance away from the chimney, there will be a small triangle park as the spatial end, as it is not possible to get closer to the chimney.

Other than the triangle park, visual order is also taken into account in the design of the museum of industrial remains, and more details about this will be provided in Chapter 4.2.6.

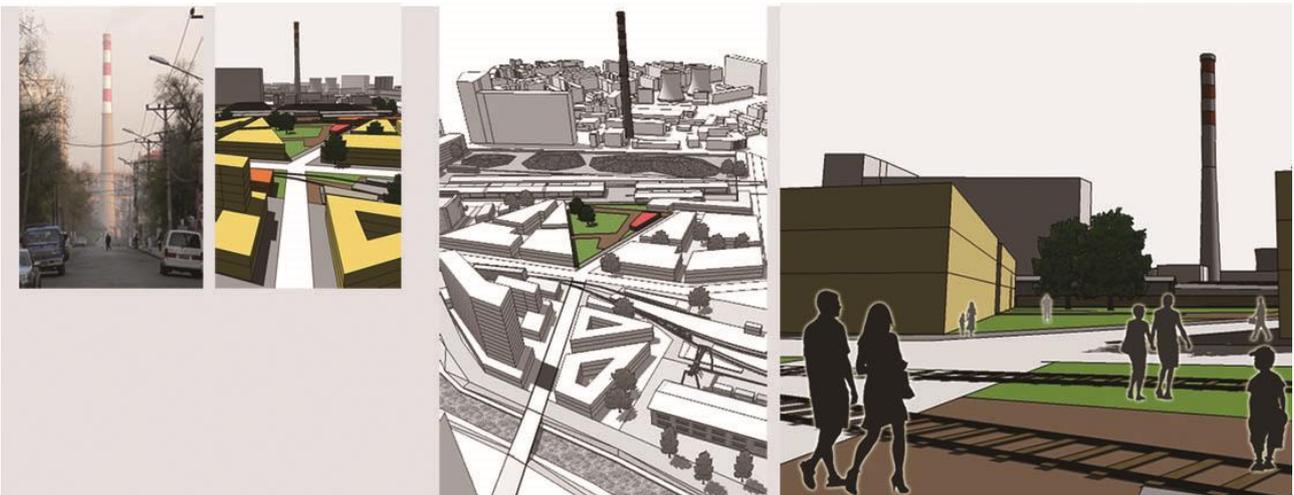


Figure 4.2.5-2. The use of chimney as a landscape

Source: Author

## 4.2.6 The Museum of Industrial Remains

As a part of the network of green spaces described in Chapter 4.2.5, the museum of industrial remains is the key content of the open spaces. The main body of the museum will be the former workshop as is shown in Picture 8a, Picture 8b, and Picture 8c. The abandoned hoist, containers, and railways could help reproducing the scene of

the old days. Moreover, a locomotive and several carriages will make the scene more real.

Figure 4.2.6-1 shows possible ways of reforming the workshop. Many cases are referable, e.g. the many museums in Rhine-Ruhr area. Also, part of the museum could be for commercial uses such as shops and bars, like the 798 district in Beijing.

Then, by such a reform, the history of the site could be preserved, and that will definitely add something to the urban culture. Therefore, the significance of this, briefly speaking, is all the significances of urban culture. Rather than the mainstream way of urban development in China which is often diminishing urban culture, this design has a will to preserve urban culture.

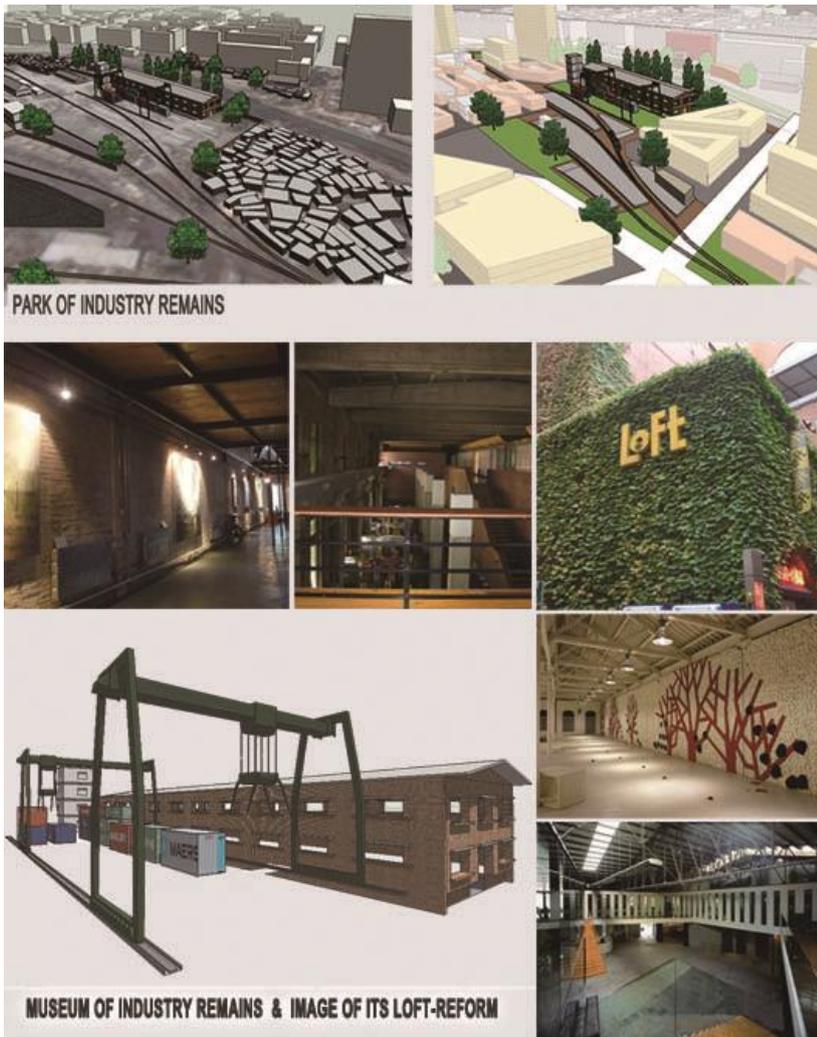


Figure 4.2.6-1. Intended reform of the old workshop—visions of the museum of industrial remains

Source: Author/Pictures from internet

The train, as an important stage property, is put on the railway, and its position is indicated in Figure 4.2.6-2 as red dot. The surrounding streets are all specially designed so that the train could be seen from as many places as possible. The red lines indicate people's vision lines. And the pedestrians (their routes indicated by blue lines) passing by could in many places (indicated as blue dots) find the train and they may be attracted and come near. In this way, the visual order of the site is strengthened.

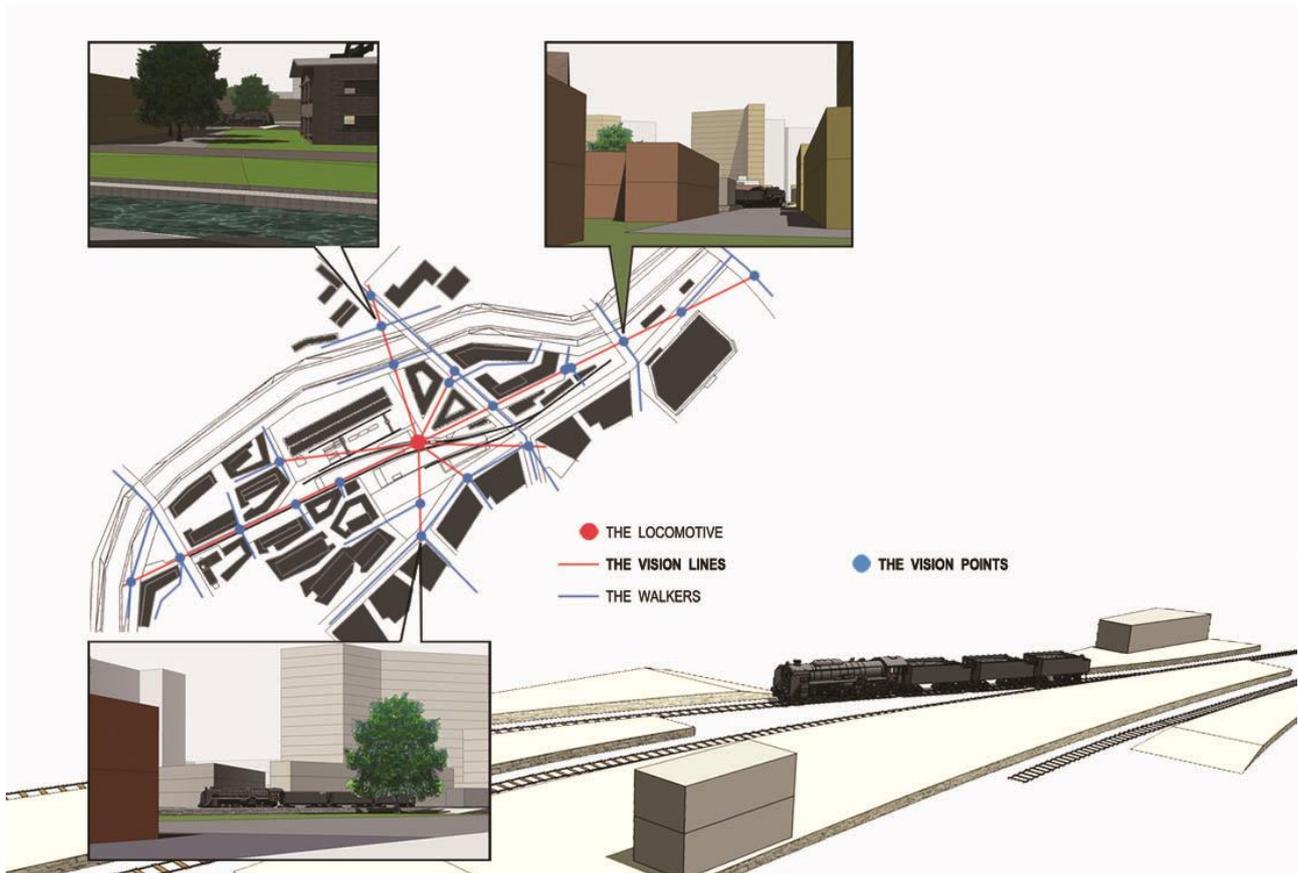


Figure 4.2.6-2. Analysis on the visual features of the train as an attraction

Source: Author



Figure 4.2.6-3. Image of the park of industrial remains

Source: Author

## 4.2.7 Summary

To summarize this chapter, the overall strategy of the design is to improve the diversity within the site. As the sub-strategies, the former business of the informal dwellers will be maintained, the new road network will merge

into the surrounding road network, the storage places will be rearranged and coordinated with other buildings and spaces, green spaces are designed together with other open spaces as a network which merges into the surrounding buildings, and a museum of industrial remains plays the central role in the system of open spaces. Visual order of the site is considered, but not as the priority. And of course, other than these, all the common things that need to be considered in urban designs will also be considered in this design. The process of design is difficult to be further described, but it could somehow be reflected from the sketch, as is shown in Figure 4.2.7-1.

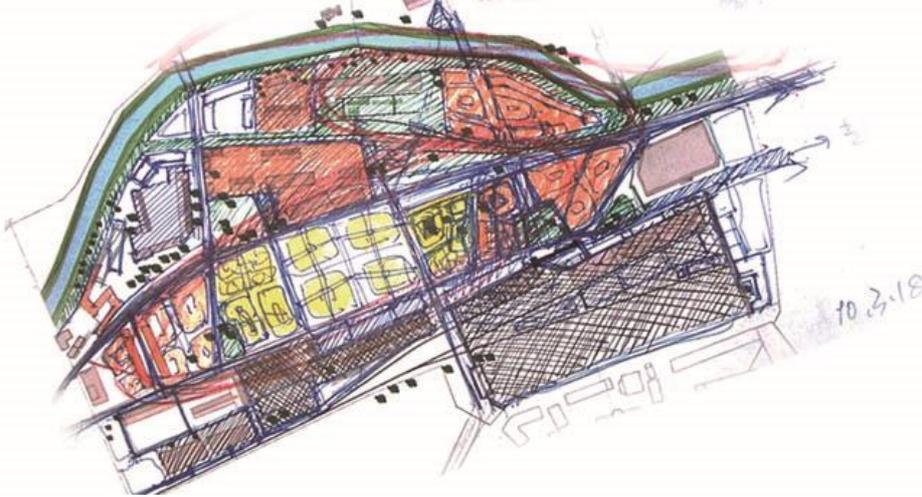


Figure 4.2.7-1. A sketch during the design

Source: Author

### 4.3 The Result of Design

Then, the new plan of the site is shown in Figure 4.3-1. The yellow buildings are for residential use, red buildings for commercial use, orange buildings for residential-commercial mixed use, i.e. they are shops in which the owners also live for their daily lives, brown buildings for industrial use, green areas for green fields, and the grey buildings are the preserved buildings. Other than these, other uses including a gas station, a supermarket, a primary school, the aforementioned museum and park, area for building materials recycling, storage for coal, and the retail outlet for new building materials are indicated with numbers from 1 to 8 in Figure 4.3-1. And, Figure 4.3-2 shows the perspective view of the site after reform.

It would be very long to introduce the whole design in more detail in texts, and that is why designs are normally shown in images. Therefore, the two images below are the main content of this chapter, and I believe information of this design could be well delivered through them two.

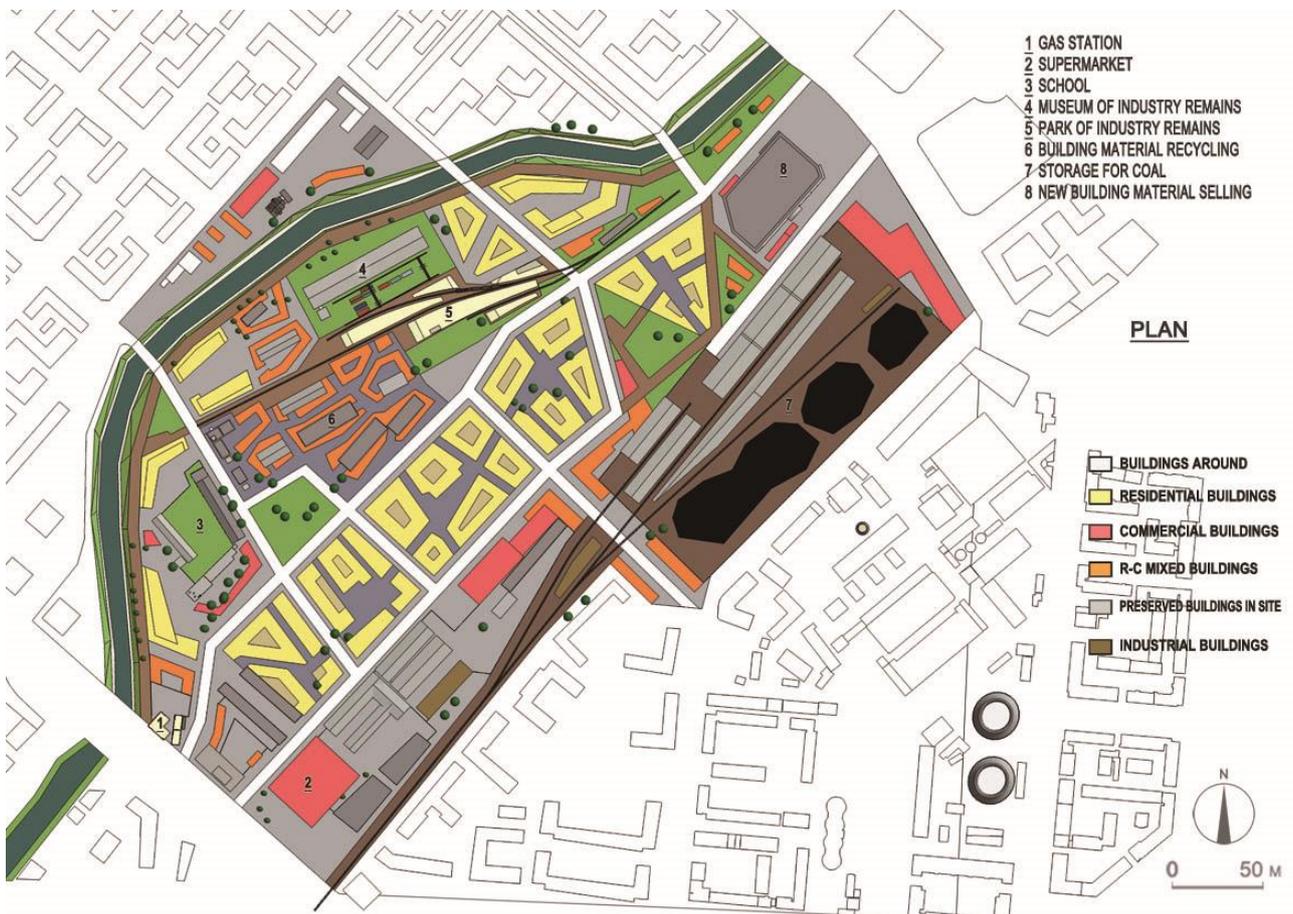


Figure 4.3-1. The plan of the site (after reform)

Source: Author



Figure 4.3-2. Bird eye's view of the site (after reform)

Source: Author

## 4.4 Analysis of the Design

In this chapter, the result of the design will be tested. Firstly, taking the guidelines in Chapter 3.4.4 as a reference, it can be found that the guidelines are all, to a larger or smaller degree, applied, as these guidelines are all considered through the process of making the design. And, as the overall strategy of this design is to facilitate the diversity of the site, the guidelines directly related to generating diversity, i.e. Jacobs' four conditions, mixed primary uses, small blocks, aged building, and concentration, will be tested more in detail below. At last, the practicability of this design will be analyzed.

### 4.4.1 About Mixed Primary Uses

Mixed primary uses have been an important point of departure of this design, and as can be seen in Chapter 4.3, the buildings with different uses are indeed mixed. Then, the next step is to analyze whether this mixed-use feature makes sense. Mixed use is largely due to the consideration for continuous users in different time of day. Then, this chapter is to analyze the users of different time of day in this site.

As can be seen in Figure 4.4.1-1, the analysis is categorized into four segments on the time basis: 06:00 to 09:00 in the morning, 09:00 to 17:00 in the daytime, 17:00 to 20:00 in the evening, and 20:00 to 23:00 in the night. Four colors are used to indicate how busy each area is in respective time—grey for rare use, brown for normal use, orange for full use, and red for over use.

In Figure 4.4.1-1-A, the situation in the morning is shown. In this time period, people going to school and to work will fill the main streets full. Early exercisers, mainly the aged people, also add more users onto the streets. Before these people concentrate on the streets, they will leave their homes first, so the places around the residential buildings will also be with a certain level of users, and that is why they are colored in orange. Most functional buildings, however, would not be very busy as it is still not the time they open. Such buildings include the building material markets (both the outlet for new materials and the recycling of old materials), the playground of the primary school, the coal pile and the storehouses, the supermarket, and the museum of industrial remains. Other than these, the grey area indicates a small company in bad business but with a big and relatively closed courtyard, and its users are expected to be very rare.

Figure 4.4.1-1-B shows the situation of daytime. All over the daytime, the area for building materials recycling and the retail outlet for new building materials will be rather busy. Most main streets would not be as busy as in the morning, except the street that connects the area for building materials recycling and the retail outlets. The school, the park of industrial remains, the area for coal storage and the storehouses for goods, and areas around other commercial or office buildings will be in full use. Users near the residential buildings will not be many, as most people are out at work. Also, as daytime is not the shopping time in workdays, the supermarket will not have many users.

Then, in Figure 4.4.1-1-C, the situation in the evening is shown. During this period, the whole site steps into its peak hour. As it is the time people go back home from work and from school, the main streets will be as busy as morning. Moreover, the small businesses such as the bars and the restaurants will all become very busy. The retail outlet for new building materials will close, but the lower-end, old building materials recycling business will still be open, as the shop runners live in their shops and they thus do not have to close their shops early. Also in this period, the supermarket will be visited most intensively. Other than the above mentioned places that are very intensely used, the residential buildings and the park will also be used by many users. Only the school, the small company that works only in daytime, the area for coal storage, and the storehouses for the retail outlet will

be relatively quiet during this period.

At last, the situation in the night is shown in Figure 4.4.1-1-D. During this period, the industrial area, i.e. the area for coal storage and storehouses for goods and the company along the railway, is inevitably to be very quiet—their works of a day are totally done. The streets and the residential buildings should also be without much users, as it is time to go back home to rest. However, as there are various small businesses, still there will be some people attracted by them. Then, the people have to pass by the streets before going to the small businesses. Therefore, not only the small businesses will be busy on their own, they will also help adding more people on the streets. As a result, even in the night, a certain level of activeness will still be guaranteed in the site.

So far, it could be observed that mixed uses have indeed brought about some positive effect: people are using different areas of the site all over the day. Looking at the whole site altogether, continuous users are guaranteed and there are always some people on the streets in different time of day. Based on this, the safety of the streets could be guaranteed, and the urban economy will also be facilitated.



Figure 4.4.1-1. Analysis on the local vitality in different time of a day

Source: Author

## 4.4.2 About Small Blocks

The importance of small blocks has already been adequately discussed, and Figure 4.4.2-1 shows how this is implemented in this design. The orange lines are the streets on different levels, from the arterial roads down to the smallest paths. It is important that these streets should all be passable unless there are some other special reasons. Then, all the places will be accessible and cross use is encouraged. Unlike the myth in orthodox planning theories that people should only stay in their own area and should be restricted from roaming around, the attitude of this design, and of this thesis, is that a unobstructed street network based on small blocks should be

built up to facilitate people's cross use of as many areas as possible. The orange dots in Figure 4.4.2-1 indicate all the crossroads where people are facing the choice to explore different areas of the site. It can be seen that the distances between the crossroads of this design is much shorter than those of the neighborhood units in orthodox plans.

However, it should be clarified that it is not the aim of this design that everyone is going everywhere. Of course there are some private spaces, such as the internal yard of a group of residential buildings, where the intrusion of strangers is not desired—and it also does not make sense for the strangers to go inside such places, as there is nothing to use or to explore. But this does not mean that these small paths should be blocked and only be open toward the locals—that would be oversensitive, even persecution maniac, as if the local community is so weak that it is even not able to bear some occasional strangers who might only be passing by for shortcuts. Actually, to demarcate spaces of different level of privacy and thus to implicitly influence who will use the streets and who will not is necessary, but there are various architectural means to achieve this, such as making the width of the streets different or making different spatial atmospheres, but not only building up fences and blocked gates. To sum, small blocks are normally favorable, but there can be more considerations to build up spaces of a proper hierarchy of privacy with the prerequisite that the restrictions imposed on the pedestrians should be kept on a minimum.

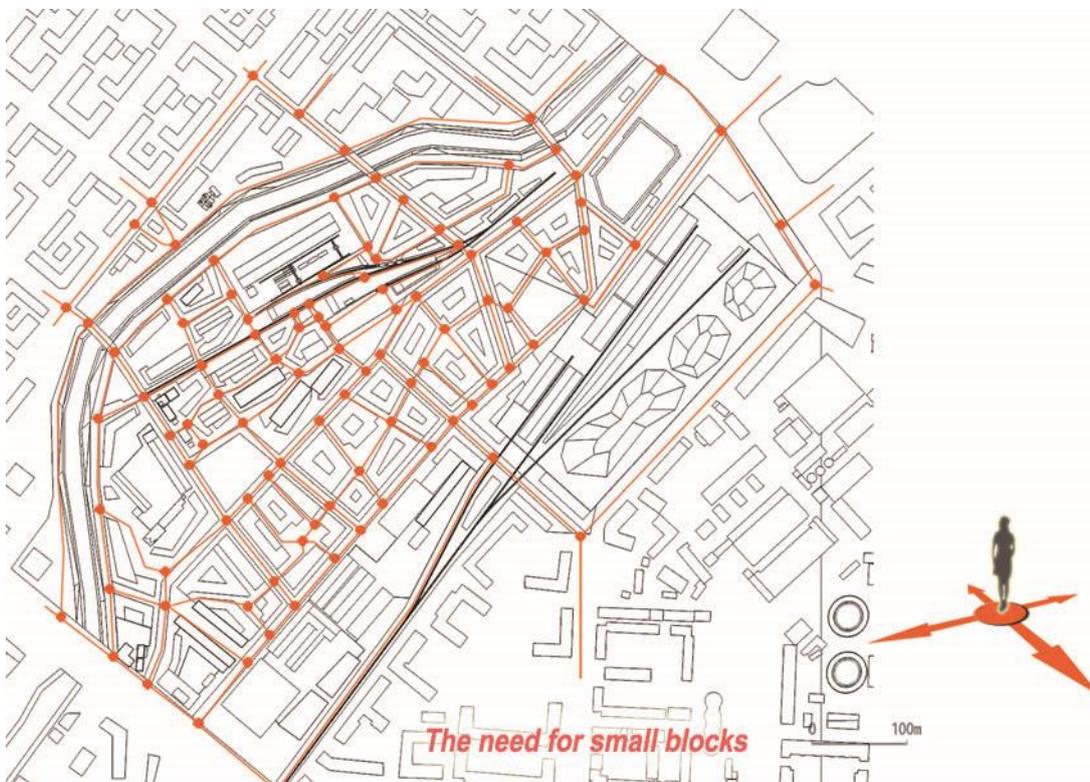


Figure 4.4.2-1. Analysis on the size of the blocks

Source: Author

### 4.4.3 About Aged Buildings

The significance of preserving the aged buildings has been argued a lot earlier, and this chapter is to see how the aged buildings in this site will be preserved.

It has to be admitted that most aged buildings in this site were in extremely poor conditions, as can be seen in Figure 4.1.4-1. Therefore, whether they worth to be preserved is a big question. It is much easier to simply remove the old buildings and to build new ones, and this would not be a big waste, as the former buildings were just too poor. However, if the contribution of aged buildings in generating a mixed urban economy is

acknowledged, the former buildings in this site should be as much as possible preserved. As a result, except the informal houses which were too much run-down and temporal, all the other former buildings are preserved, as is shown in Figure 4.4.3-1. These preserved buildings include the retail outlet for building materials which is still new, the many storehouses which were fine and were still in use, the old workshop which will become the museum, and the administration houses as were shown in Picture 13a and Picture 13b in Figure 4.1.4-1. Many of these buildings will be given new functions such as restaurants and school, but what they share in common is the cheap price, which makes them the carriers of the businesses which are small and not so profitable.

It has to be admitted that for a big city, especially in the city center, the proportion of aged buildings preserved in this design is still too low, but this is only because of the special conditions of this site. Normally, more old buildings should be preserved and new constructions should only slowly take the place of the buildings in worst conditions. Only in this way could an “economy of time” be gradually achieved.



Figure 4.4.3-1. Analysis on the preservation of the aged buildings

Source: Author

#### 4.4.4 About Concentration of People and Density of Buildings

From the point of view of concentration of people, Jacobs has criticized the decentralism cities, i.e. mainly Howard’s Garden Cities. She has argued that a certain degree of concentration of people especially facilitates the development of a healthy urban economy.

But concentration of people is not effective on itself; it has to go together with a right type of spaces. This is why Jacobs also criticizes Le Corbusier’s tower buildings which do bring about a higher concentration of people, but which have drastically increased the distances between buildings and lowered down the chances of people’s contacts. Figure 4.4.4-1 is to illustrate this point. In the two pictures, the amounts of buildings are the same, and the amounts of people they could accommodate should therefore also be the same. However, in the upper picture which is in Corbusier’s style, people normally stay at home as the spatial feature hints so—there is nothing to explore in between the buildings except vast green fields, and the distances between the buildings are also too long, making people’s contacts very inconvenient. While in the bottom picture which is in the traditional

cities' style, people are much more likely to go onto the streets and to participate in a pleasant urban life as, firstly, there will be various attractive businesses on the streets and, secondly, it is easy to do so as the houses are in immediate proximity to the streets. Moreover, if a healthy and attractive local urban life is built up, strangers will also be attracted and will stay, and they also contribute to a more vivid local urban life.

On the basis of systems theories, the significance of concentration of people has also been discussed, and that could mainly be found in Chapter 2.3 and Chapter 2.4 of this thesis. I will not further repeat them here, and the purpose of the next part of this chapter is to see whether concentration of people is achieved in this design.

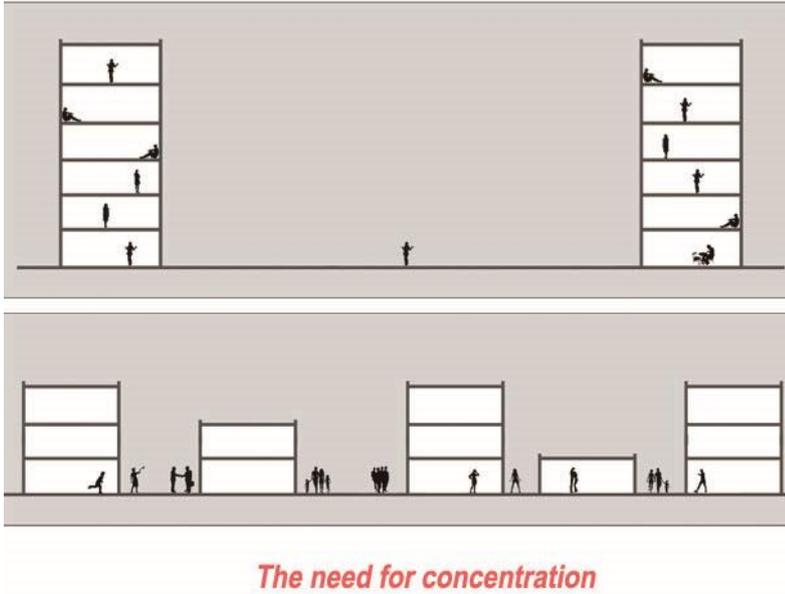


Figure 4.4.4-1. Comparison of two different types of spaces

Source: Author

In Figure 4.3-1, it can already be found that the density of buildings is high in this site compared with the surrounding areas. This is because that all through the design, the density of buildings was considered as an important value: not only it guarantees the concentration of people, but also it ensures the concentrated people will have proper places to meet and to contact.

There could be an interesting question: what would the site be if neighborhood unit is applied? I happen to have such a design as a comparison: my first-time design of this site in 2008 which was a part of my tasks for my Bachelor degree. That design is shown as the right part of Figure 4.4.4-2. It could be found that, other than the retail outlet for building materials, an area preserved for industrial use, and several old buildings, the whole site was composed of a typical neighborhood unit and a huge park. At that time, I was just an undergraduate, and my head was filled with the pursuit of low-density tower houses and green fields. Now to review my first-time design, I feel it mostly wrong. But I also feel it normal, as it is just the mainstream way of urban development in China which I was educated to follow.

Fortunately, now I have eventually realized the value of concentration of people which is often supported by high density of buildings, and I have tried to incorporate this value into my design.



Figure 4.4.4-2. Comparison of the building densities in two times of design on the same site

Source: Author

#### 4.4.5 Analysis on the Practicability of the Design

So far as the design is introduced and as its features with respect to increasing diversity are specially analyzed, everything seems to look fine at first sight. However, whether such kind of a design could be practiced in today's China is a big question. I have not seen any real project like this design in any place in China in recent years. This somehow implies, to simply say, and to sadly say, that this design is impractical for now.

Now it is pertinent to look back at Chapter 3.4. This design has applied the contents in Chapter 3.4.1, Jacobs' four conditions in generating urban diversity, and partly in Chapter 3.4.4, some guidelines for design. Simply applying these to design is easy, but they are actually highly dependent on what have been written in partly Chapter 3.4.4, in Chapter 3.4.2, and in Chapter 3.4.3, i.e. the suggested planning and architectural laws and regulations, the way of governance, and the way of policy making.

Firstly, the change of the planning and architectural laws and regulations will already be difficult. Sunshine and green fields are two things people care about very much. If to lower down the standard of sunshine spacing and greenery rate, people may not like this. Also, as have been argued earlier in Chapter 3.2.3.5, the value of the physical features of spaces, such as green fields, low density, etc., have long been over-considered and the social and economic effects of them have thus been under-considered. Therefore, before the complexity of cities could be more widely understood and accepted, it could hardly be expected that the planning and architectural laws and regulations will be changed much.

Secondly, an important point of this design is to preserve the business of the informal dwellers. However, as the government's regulation on businesses in China is relatively higher, only when the local government changes its

normal way of governance could such preservation be realized. The seemingly not-so-decent business of the informal dwellers should be tolerated and encouraged where possible, and only through this can the informal dwellers gradually benefit from their business and to get rid of their miserable situation before.

Thirdly, to implement such a design, only the drawings are far away from enough. A well designed policy plays a fundamental role in realizing such a design. In the normal way, the land will be sold (of course for only 70 years) as a whole, or in 2 or 3 pieces, and the policy is simple: the land developers are required to compensate the former dwellers according to certain standards. However, in this design, things the government needs to do are much more complicated: it needs to negotiate with the former users of the storehouses, to talk with the power plant to evaluate whether the new place for coal storage is better, to cut the whole site into much more pieces and to sell them to different developers and to set different regulations for each piece of land according to their expected uses such as high-rise residential area, low-rise residential area, commercial area, residential-commercial mixed area, etc., and to subsidize public projects such as the museum, the primary school, and the parks. Then, it must be that the government is able to make proper policies to cover, including but not limited to, all the above-mentioned things. It obviously requires the government to improve its capacity, which the government might feel quite uneasy to deal with but which it should be, and it must be a long process. Before the government could eventually be able to deal with such complex issues and to accordingly make proper policies, this kind of a design could never be practiced.

#### **4.4.6 Summary**

To summarize this chapter, the guidelines in Chapter 3.4.4 are all more or less considered in this design. Especially, those guidelines in respect with the diversity of the site were specially considered and were made full effort to be embodied in the design. The site is with mixed primary uses, and this will bring about continuous users onto the streets in most time of day; small blocks are designed instead of the super blocks formed by neighborhood units; aged buildings are as much as possible preserved; high density of buildings are carefully designed to ensure a concentration of people who are well interacting with each other. However, considering the current conditions with regard to the planning and architectural norms, the way of governance, and the quality of policies, this kind of a design seems not to be possible to be practiced soon.

### **4.5 Summary of Chapter 4**

So far, all through Chapter 4, the urban design of the inland-port of Harbin is introduced. It is a design to suggest a possible way of reforming a site which is located in the city center of Harbin but which was mostly forsaken and was in a very poor situation. With an overall strategy of improving the diversity within the site, multiple sub-strategies are applied. Then, to analyze the result of the design, it could be found that various suggestions made before, especially those in Chapter 3.4.1 and Chapter 3.4.4, are applied and they are very likely to increase the diversity of the whole site. Based on this, the complexity of the site is respected, and it can therefore be expected to have a better, systematical development in the future. However, considering the current situation with regard to the planning and architectural norms, the way of governance, and the quality of policies, this design is far away from being able to come true immediately.

## 5 Summary and Conclusions

Now we have undergone everything of this thesis. In this chapter, the whole thesis will be reviewed and concluded.

In the beginning of this thesis (Chapter 2.1), Jacobs' (1961) thoughts on urban planning, being proposed half a century ago but were not introduced into China until 2005, were introduced. Jacobs has observed many features peculiar to the natures of cities in the US. Some of them, as the main argument of this thesis, may be transferred to the Chinese cities. Jacobs holds that the urban streets have more purposes besides carrying vehicles, and they are safety, contact, and assimilating children. She also holds that neighborhood is not a simple concept which may lead to a trend which downgrades cities into "small parcels of towns". Neighborhoods are only useful when they are incorporated into the context of the whole city. Then, she has proposed four indispensable conditions, mixed primary uses, small blocks, aged buildings, and concentration, to generate diversity in cities. These thoughts of Jacobs are more convincing compared with many doctrines in the orthodox planning theories, and the reasons are that Jacobs has had a much more in-depth observation and analysis on the social and economic aspects of cities.

In Chapter 2.2 of this thesis, Jacobs' thoughts were linked with system theories. This is reasonable, as Jacobs was obviously holding a holistic attitude and was viewing the cities as complex systems. Bertalanffy's thoughts about organisms (1951), a prologue of his later General System Theory, were reviewed first. Bertalanffy argues that although organisms have clear structures, the substances that compose them are continuously flowing, and this dynamic flow should be viewed as their essence. Then, Bertalanffy proposes "organismic conception", which means organisms are (1) wholes instead of accumulation of smaller units, (2) dynamic instead of static and mechanic, and (3) active instead of passive and reactive. Then, Bertalanffy proposes an important view that organisms are open systems and states the characteristics of open systems.

The final generalization of organismic conception leads to the proposition of General System Theory (Bertalanffy 1951). GST is a general theory of organization, and it aims at explaining concepts such as organization, wholeness, directiveness, teleology, and differentiation that are alien to conventional physics. These concepts are indispensable for dealing with living organisms or social groups. Bertalanffy discusses the above-mentioned concepts by means of mathematics. He discusses the isomorphism in science and holds that GST is particularly useful for those sciences that cannot be fitted in the framework of physics and chemistry, such as sociology, and this is likely to benefit the study on cities. Also, Bertalanffy points out the hierarchical order in systems and holds that on different levels, there are different kinds of organizations and different laws. The relations between different levels in each case should be individually suggested.

Holland's Complex Adaptive Systems (1995) tries to build up an understanding of systems in a bottom-up way. His theory also explains how complexity of a system generates: through adapting to other adaptive agents (and the environment). In CAS, there are seven basics: aggregation, tagging, nonlinearity, flows, diversity, internal models, and building blocks. These seven basics were introduced one by one by Holland, and they were briefed in this thesis. Also, how these basics together push the development of CAS was discussed.

Then, in Chapter 2.3 of this thesis, cities are being related with the systems theories. As partly organisms, cities are obviously with wholeness. However, as have been argued in Chapter 2.3.1 that, firstly, cities should be only with a certain degree of wholeness and it is dangerous to over integrate cities if the corresponding urban societies have not reached such a high degree of wholeness and that, secondly, superficial or radical means may not help pushing cities into higher wholes. The key point in facilitating the wholeness of cities is the broad

interactions among people. A top-down planning may not lead a city to real wholeness, while a mixed use of land and flexible land policies may essentially facilitate a city to develop into a higher whole, as the interactions of people in the city will be encouraged. In this way, an urban system can evolve into a more advanced level.

Cities are open systems. Therefore, continuous input of energy is needed for cities, and cities use these energies to generate dynamic orders. And, compared with their static structures, the dynamic order is the essence of cities. Also, the natures of open systems imply that the development of cities is eternal and is without a foreseeable final status.

From the systems' point of view, cities also have some other characteristics. Cities are active systems, and their running is essentially decided by their internal urban societies which are active, and external environments are only of secondary importance. Of the hierarchical order of all entities, cities should be corresponding with socio-cultural systems which stand on a very high level, as cities are the spatial holders of urban societies. Given its limitation, reductionism could not explain everything of cities and empirical observations and explanations on cities are still important means to study cities. Moreover, the hierarchical orders inside cities and borders in urban systems were also discussed in Chapter 2.3.3.

From CAS's point of view, there are the following understandings: "agents" in cities are people, and the adaptations among people should be encouraged; aggregation of people is a prerequisite for urban systems; various tags play an important role to support people's adaptations in cities; diversity and nonlinearity are important features of cities; mix of different people facilitates the flows in cities; taking combinations of parts of cities and introducing the combinations to other places can be a tool in urban planning and it looks better than reductionism.

Based on the above understandings, different planning theories were reviewed in Chapter 2.4. It was found that from a systems' point of view, Jacobs' thoughts are often facilitating the development of urban systems in different ways, while many principles in orthodox planning theories are actually harming the development of urban systems. Many assumptions and assertions in orthodox planning theories are not true.

Then, in Chapter 3, the situation of the contemporary Chinese cities was introduced. After a brief review on the history of the Chinese cities after 1949, the focus moved to today's Chinese cities. As is written in Chapter 3.2.1, the following phenomena can be seen: zoning is being intensively applied in urban planning; the size of blocks is obviously becoming larger than before; the degree of standardization is becoming higher, which is largely due to the adoption of neighborhood units; many satellite cities have been built in the out skirts of cities; there even emerged some brand-new cities. The consequences of these phenomena, in one sentence, are that the complexities of cities are becoming lower. Then, it might even be that the actual degrees of development of cities are degenerating.

Chapter 3.2.3 analyzes the reasons of the aforementioned phenomena and their consequences: the leading role of the government is too strong, and localized self-governance is missing; the local governments earn huge income by selling land and they are therefore zealous in pushing faster urbanization; it is easier for the governments to sell lands in big pieces; the planning laws and regulations are very strict, which forces both the conformation and types of buildings to be standardized; historically, the introvert, scattered, and self-duplicating urban spaces have been favored for long and that is why they are still favored today. Moreover, the arrogance of designers and a general lack of understanding of the complexity of cities are also reasons, although not so decisive.

In Chapter 3.3, stories and sceneries from my own life experiences were introduced in order to reach a more intuitive observation and understanding of the problems of today's Chinese cities. The issue of safety, of urban

society, and of urban economy was respectively discussed. Also, in that chapter, it was expected that some traces of possible solutions could be discovered.

Then, after an adequate observation and understanding of what are happening in today's Chinese cities, reforming suggestions were given in Chapter 3.4. It was firstly argued that Jacobs' four conditions (mixed primary uses, small blocks, aged buildings, and concentration) in generating diversity in cities are all possible to be adopted in Chinese cities, although the prospect of localized self-government is not optimistic. More suggestions about governance, about policy making, and about the planning and architectural norms and the guidelines for design were given in Chapter 3.4.2, Chapter 3.4.3, and Chapter 3.4.4.

How much the suggestions given in Chapter 3.4 would work in the Chinese context? Chapter 4 of this thesis tries to answer this question, using an exemplary local design study. It is about an urban design for the inland-port of Harbin which was an informal and forsaken area in the city center. All the conditions of that land were typical, as can be commonly seen in today's Chinese cities as introduced in Chapter 3 of this thesis. This exemplary nature makes the case example a perfect site to experiment with my suggestions. Then, as was shown in Chapter 4, a design was finally produced and it is definitely not like the mainstream way of urban development in today's China. The overall strategy of this design is to increase the diversity of the site, and various sub-strategies were applied in the process of design. At last, analyses from multiple aspects were made to check whether or not this design is in accordance with the foregoing arguments of this thesis, and the result looks to be confirmative. This has shown that a different way is possible. But of course, this design will be in many places in conflict with the current way of governance, the current way of policy making, and the current planning and architectural norms. However, all the non-existing things must be at some points in conflict with the existing situation. When the existing situation changed, the impossible things would become well possible, and what we need to do is to facilitate this change in all possible ways.

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