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The Evolution and Retrofitting of Work-unit Communities Under a Self-organizing Logic:

Cases in Nanjing, P.R. China

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The Evolution and Retrofitting of Work-unit Communities Under a Self-organizing Logic:

Cases in Nanjing, P.R. China

A dissertation presented

by

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to

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Abstract

The Evolution and Retrofitting of Work-unit Communities Under a Self-organizing Logic:

Cases in Nanjing, P.R. China

Dissertation Advisor: Professor Peter G. Rowe

By: Jingping Liu

Keywords: Work-unit community, self-organizing, typo-morphology, administrative evolution,

morphological evolution, retrofitting

During China's thirty years planned economy era (1949-1978), including the following

two decades, the work-unit system has played a significant role in the country and has effectively

promoted its economic growth by virtue of the system's combined political, economic and social

functions. However, as the domestic and international environment changed around the 1980s,

the government slowly abandoned the work-unit system after deeming it an impediment to the

country's modernization. While the policies could be implemented quickly, the system's

physical space, which mostly consists of the working quarter and the living quarter, was not so

easily erased. In reality, because of the economic situation' limitations and the political priorities

concerning the working quarter redevelopment in the reform's early stage in the country, there

has appeared a separation of working and living, and a lag of the work-unit community (the

living quarter) development in the country. While large numbers of working quarters have been

regenerated, relocated or demolished, and lots of researches have been done on the work-unit

redevelopment, the majority of which are centered around the working quarter, most of the work-

unit community are left behind and faced with the lash of the market economy, rapid urban

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development and physical deterioration on their own. Today, forty years have passed since the 1978 economic reform, due to all kinds of changes that have happened in the country, such as the new economic situation, urban sprawl and the existing stock-based development policy, there now exists a viable housing stock in the work-unit community area and it would be necessary and enforceable to retrofit them.

In this context, in order to fill the gap of the work-unit community study in the country, to provide innovative research ideas and methodologies for the field, to provide strategic support for the national existing stock-based development policy, and to enrich the research on work-units in the second-tier cities of the country, this research aims to explore reasonable and applicable retrofitting strategies that would follow the inner self-organizing logic of the work-unit community. This will be done by studying both the administrative and morphological evolution of specific work-unit community cases in Nanjing, with the self-organization theory as a supporting theory and the typo-morphology approach as the primary physically-oriented methodology.

In summary, administratively, residents' sense of autonomy is the key to the retrofitting of the work-unit community. In the meanwhile, other participants in the community management should assist residents in the process, especially the street office, residents' committee, planners and designers. Morphologically, three main retrofitting strategies are finally proposed. Namely, to increase the degree of openness in a limited way, to improve the competition mechanism in the work-unit community, and to focus on variable retrofitting strategies.

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Chapter 1. Introduction

1.1 Concept Clarification: Work-unit, Community, and Work-unit Community

1.1.1 Work-unit

Danwei, or "work-unit", generally refers to enterprises, institutions and their related policies, and public institutions that would offer various employment opportunities to urban residents, including factories, schools, hospitals, research institutions, shops, cultural organizations, and Party and government offices.¹

With the establishment of P.R. China in 1949, the Communist government had begun to transfer the land ownership from landlords to the government, along with which work-unit appeared as a new kind of urban community form. With a strong mind to quickly recover from the 12 years-long wars (1937-1949) and to create a great socialist China, everyone in early P.R. China was sharing a strong collective mind to fight for the ultimate communism. Urban populations were gathered around different working places, including administrations, industries and public institutions. And the work-unit space was arranged in order to directly promote socialist collectivity and proletarian consciousness among its members, which means that work-unit was a spatial machine for more production and less consumption.^{2, 3, 4}

¹ Chai, Yanwei. "Danwei-Based Chinese Cities' Internal Life-Space Structure- A Case Study of Lanzhou City (in Chinese)." *Geographical Research* 15, no. 1 (1996): 30–38.

² Shaw, Victor N. Social Control in China: A Study of Chinese Work Units. Westport, Conn.: Praeger, 1996.

³ Bray, David. *Social Space and Governance in Urban China: The Danwei System from Origins to Reform.* Stanford, Calif.: Stanford University Press, 2005.

⁴ Lu, Duanfang. *Remaking Chinese Urban Form: Modernity, Scarcity and Space, 1949-2005.* Florence: Routledge, 2006.

The work-unit based system could be named as work-unit system and its most distinct characteristic was the common welfare provided by the state. Jobs, houses and social services were all prescribed and provided in different walled districts. "Each *Danwei* thus constructed its own housing, child care, schools, clinics, shops and services, governing the everyday life of the individual.". According to Butterdield, a journalist who ever recounted *Danwei* life, "uniformed army guards were stationed at the main entrance and all visitors to the compound had to be identified and recorded at the sentry box".

There have been various views on the origin of the work-unit system in the country, namely, the influence of the Soviet model, the origin of the Yan'an Base system, the origin of the reform of the Republic of China system, the legacy of workers' struggle, and the superposition of different systems. First, the influence of the Soviet model. As Rowe and his colleagues described in their book, physically, the work-unit space was highly influenced by the City-based Large Block System of Soviet, especially its perimeter blocks, in which housings are arranged around the edge of the block and the public buildings or non-residential ones are located in the center. With a strong sense of order, the perimeter block, as well as the style of "Socialist Content, and National Form", was adopted as the major spatial form and architecture criterion at the beginning. Then, however, the parallel layout, in which the buildings are lined up in a row facing south, was favored over it after the debate in the mid-1950s in the country, which was assumed to be more consistent with China's climate and living habits, as well as the limited

⁻

⁵ Rowe, Peter G., Forsyth, Ann, and Kan, Har Ye. *China's Urban Communities: Concepts, Contexts, and Well-Being.* Boston: Birkhäuser, 2016.

⁶ Rowe et al., 2016.

⁷ Xue, Wenlong. "The Institutional Origins and Construction of Danwei-Community-The Case Study of Harbin in 1946s-1960s." Doctoral Dissertation, Jilin University, 2016.

budgets conditions.⁸ Also, the parallel layout could avoid nuisance from adjacent roads and streets. In the meanwhile, because of the central control about the work-unit construction, a high degree of standardization was achieved. As Bray wrote:

the basic design principle was to align key architectural elements along a central axis, while lesser subsidiary elements were arranged in groups on either side of the main axis. Large-scale *Danwei* often had one or two additional axes situated parallel to the central axis. The purpose of this axial arrangement is clearly symbolic and derives in part from the principles of classical Chinese architecture...as the designs for temple or palace complexes were always based upon an axial progression of major architectural and spatial elements.⁹

Second, it is originated from the Yan'an Base. ¹⁰ After the foundation of P.R. China, the Communist Party of China (CCP) directly controls a complete administrative power system and the Party's revolutionary team is directly transformed into the official body of the new state. Therefore, in the process of the industrialization initiated in the early 1950s, there is the possibility of integrating the Communist Party's base system into the modern industrial system, especially its supply system, which is a military communist distribution system.

Third, it is originated from the reform of the Republic of China system. The social management model of the National Government period, such as the Bank of China case analyzed by Ye Wenxin, China's weapons industry and the heavy industry enterprise system analyzed by Morris L Bian, and other traditional guilds, gangs and corporations in the cities of the republican period are all proofs that the work-unit system existed before the foundation of P.R. China.^{11, 12}

⁸ Rowe et al., 2016.

⁹ Bray, 2005.

¹⁰ Lu, Feng. "The Origin and Formation of Chinese Work-Unit System." *Chinese Sociology* 2 (1993): 91–134.

¹¹ Xue, 2016.

¹² Bian, Morris L. *The Making of the State Enterprise System in Modern China: The Dynamics of Institutional Change*. Cambridge, MA: Harvard University Press, 2005.

Fourth, it is a legacy of workers' struggle. Based on Elizabeth J Perry's analysis of Shanghai workers' movement in the 1920s to the 1940s, the privilege enjoyed by workers in state-owned enterprises of P.R. China can be partly explained by the government's recognition of the potential economic and political power of the workers' group.¹³

Fifth, the superposition of different systems. Some researchers deem that the work-unit system is superimposed by many different policies and systems. This viewpoint notes the complexity of the formation of the work-unit system, which contains a lot of combing and synthesis of existing researches. Thus, it can be regarded as a summary and sublimation of the existing research to some extent. In this research, the author deems that Bray's argument is more reasonable. In his book, David Bray maintains that:

...But this (the emergence of the *danwei* as the key basic unit of urban life) didn't happen overnight- the establishment of the *danwei* was never proclaimed, and there is no particular date or event or even specific policy to which we can solely attribute its origin. Its emergence was the result of a complex layering of various disparate practices, institutions, and policies over a long period...¹⁴

In fact, with the implementation of the First Five Year Plan of 1953-1957, the first planned industrialization of the country, numbers of work-unit compounds were built all over the country. "By 1957, 90% of the urban population of China was living within a *Danwei*". At the same time, the private urban land ownership went to the end gradually. In the next two decades, "the proportion of privately-owned houses throughout China declined so that by 1978, only 9.9

¹³ Perry, Elizabeth J. *Shanghai on Strike: The Politics of Chinese Labor*. Stanford, Calif.: Stanford University Press, 1993.

¹⁴ Bray, 2005.

¹⁵ Stokols, Andrew. "Re-FORM: Accessibility and Community in China's Superblock Neighborhoods." Doctoral Dissertation, Harvard University, 2017.

percent of all houses were owned privately". This kind of absolute central governance based on different work-units ushered in a unique administration system, which was known as the *tiao-kuai* or "strips and chunks" system: the strips represented the hierarchical organization of state ministries and work-unit, while the chunks represented territorial levels of control from provinces down to counties, cities, and urban districts. In other words, work-unit was controlled directly by the central government, which made them a higher administrative authority than territorial authorities such as mayors and governors. According to Bray, "Centrally funded construction projects came under the jurisdiction and control of the relevant central ministry or bureau (strip) rather than under the local city authorities (chunk), so it was always very difficult for city authorities to maintain the integrity of an overall city plan". Is

All in all, work-unit is more than just a working place, instead, it is a system, which could be described as universal organizations that integrated social control, political integration, resource allocation, social security and many other functions. ¹⁹ Qiao summarized in his paper that work-unit was the basic components and operational units of the national political, economic and social structure. Politically, work-unit had certain administrative level and was a part of the entire country's political system, through which individuals were connected to the central government within the unique *tiao-kuai* in Chinese or "strips and chunks" administration system. Economically, work-units were relatively independent established economic entities and acted as central roles in the operation of national resources. Socially, work-unit was a special form of

¹⁶ Lü, Junhua, Peter G. Rowe, and Jie Zhang. *Modern Urban Housing in China, 1840-2000*. Munich: New York: Prestel, 2001.

¹⁷ Stokols, 2017.

¹⁸ Bray, 2005.

¹⁹ Chen, Zhicheng. "From 'Unit Man' to 'Social Man'- Inevitability Trend of Urban Community Development in P.R. China (in Chinese)." *Journal of Wenzhou University (Social Science Edition)* 14, no. 3 (2001): 70–74.

social organization used in urban communities and was the basic unit of social structure.²⁰ Each work-unit could be seen as a "self-sufficient" community. Workers in one work-unit do not necessarily need to leave the community to live their lives.

In general, during the work-unit era, the majority of citizens belong to certain work-units, while the few remaining ones belong to private or collective corporations. And the latter has to rely on local governments to provide housing and other public facilities, which in general are in worse conditions than the work-unit because of the lack of fund from the central government. At the same time, each work-unit was a walkable and convenient community since basically residents or workers did not need to consider about the long distance of the intra-city travel: they were living in or near where they worked and were provided basic supported facilities.

However, after going through thirty years' ups and downs, including the economy recovery period (1949-1957), "The Great Leap Forward" and "Economic Readjustment" period (1958-1965), and the "Cultural Revolution" period (1966-1977), it was found that the planned economy, as well as the work-unit system, was becoming an obstacle for P.R. China's modernization and rapid development. Then along with the implementation of the Reform and Opening-up policy in 1978, the planned economy was gradually replaced by the socialist market economy with Chinese characteristics. And the work-unit system was abandoned at the same time. However, the breakdown of a system does not mean the disappearance of its carries, which means that the work-unit space still exists despite of the abandonment of the work-unit system. Both the working and the living quarter have been standing there and their long-lasting effects could still be seen today, which incurs continuous researches ever since then.

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²⁰ Qiao, Yongxue. "History Flux if Beijing Unit Yard and Its Effect on Beijing Urban Space (in Chinese)." *Huazhong Architecture* 22, no. 05 (2004): 91–95.

Anyhow, work-unit is a special organization system with strong Chinese characteristics in early Socialist China. To gain an international understanding of this particular system, the company town in U.S. could be studied and compared with the work-unit.

Company town in U.S. context refers to a community inhabited chiefly by employees of a single company or group of companies which also owns a substantial part of the real estate and houses. This definition of company town excludes Detroit or Washington D.C., locales with a dominant "industry" or a dominant business enterprise and eliminates other types of industrial communities that are often confused with company towns, such as industrial towns like Homestead, Pennsylvania, which depended on a single employer, but were developed by private interests, and experimental and communitarian settlements, such as New Harmony, Indiana, Amana, Iowa, and Oneida, New York, which were economically based on industry or agriculture, but were communally owned. And housing projects or suburbs intended for industrial workers but developed separately from industrial facilities were also excluded. Despite of the different value localizations about the company town in U.S. history, it is worth studying in this research because of its similarities to P.R. China's work-unit in at least the physical organization form of the living quarter around the working place. 23, 24

On the one hand, the company town and the work-unit differed from each other in certain aspects. For instance, the latter was mostly state-led, top-down, nationally distributed in urban areas, and residents or workers were working hard for the same national object because of the

²¹ Crawford, Margaret. *Building the Workingman's Paradise: The Design of American Company Towns*. Haymarket Series. New York: Verso, 1995.

²² Crawford, 1995.

²³ Reps, John William. *The Making of Urban America: A History of City Planning in the United States*. Princeton, N.J.; Oxford: Princeton University Press, 1965.

²⁴ Crawford, 1995.

patriotism, collectivism and socialist ideology in early P.R. China while the former was mostly private company-led, located in suburban or remote rural areas, serving the company's private profit, and suffered from continued workers' unrest or strikes due to the individualism culture in U.S.. On the other hand, however, both of them aim at improving the industry's productivity through a proximity arrangement of the working and living space, a welfare system to ensure workers' living environment. And each of them was acting as an independent or enclosed organization form to certain degree. ^{25, 26, 27}

Thus, it is possible to gain a better understanding of work-unit by comparing it with U.S. company town. Both the dissimilarities and similarities of them would help. Nonetheless, one thing that must be made clear is about the proximity arrangement of the working and the living space of these two forms. While Crawford's definition of company town has excluded the housing projects or suburbs intended for industrial workers but developed separately from industrial facilities, for the work-unit in P.R. China, the separation of the living and the working quarter did exist, especially for those small- and middle-size work-units. Some work-units would share the living quarter, generally named as workers' "new villages" or *xincun* in Chinese, and some would construct their own ones because of the limited land, both of which would be independent from their living quarters, but not too far. But it should be noted that, in this research, workers' new villages inhabited by employees of multiple work-units, are not the research object in this study.

1.1.2 Community

²⁵ Crawford, 1995.

²⁶ Shaw, 1996.

²⁷ Bray, 2005.

The word "community" derives from Latin. At the beginning, it is thought to be a stress on personal social interactions, also the roles, values, and beliefs based on such interactions.²⁸ However, because of cultural and ideological differences, the appellation and meaning of community in different countries are more or less divergent. U.S., a country with a strong international influence, offers a good reference to understand P.R. China's urban communities. Through a comparison of definitions of community between U.S. and P.R. China, readers would obtain a better sense of the work-unit community in P.R. China.

In U.S., communities are mostly following the definition of Tönnies. People belonging to the same community are mostly sharing similar roles, values and beliefs. Typical cases in U.S. history are different communitarian experimentations.²⁹ For instance, resolute religious groups were seeking freedom from intolerance and persecution from the early 17th into the 19th century, named as "Building Zion".^{30,31} Then, early in the 19th century, a nascent form of Socialism against negative effects of modernization and industrialization appeared as "Seeking Harmony".^{32,33,34} Afterwards, towards the end of the 19th century, a similar reaction to conditions in the industrial city was made by a social-mided community, named as "Anticipating

²⁸ Tönnies, Ferdinand. *Community & Society (C. P. Loomis, Ed. & Trans.)*. East Lansing, Mich.: Michigan State University Press. (Originally published 1887), 1957.

²⁹ Krieger, Alex. *City on a Hill: Urban Idealism in America from the Puritans to the Present.* Cambridge, Massachusetts; London, England: The Belknap Press of Harvard University Press, 2019.

³⁰ Sellers, Charles L. "Early Mormon Community Planning." *Journal of the American Institute of Planners* 28, no. 1 (1962): 24–30.

³¹ Krieger, 2019.

³² Owen, Robert. A New View of Society; or, Essays on the Principle of the Formation of the Human Character, and the Application of the Principle to Practice. London: Printed for Cadell and Davies, 1813.

³³ Noyes, John Humphrey. *History of American Socialisms*. New York: Dover Publications, 1966.

³⁴ Krieger, 2019.

Alturia". The Great Depression unleashed a new back-to-the-land movement, not aiming to revive communitarian socialism but to promote decentralization, namely, "Reconnecting with the Land". During the 1960s, some young idealists formed upwards of two thousand communes, temporarily rejecting the materialism and conspicuous consumption of mainstream America. And this kind of "Dropping out" wave revivied interest in older communitarian traditions. In a more recent age, Celebration, California, has also been a typical U.S. community built based on the aesthetic and communal values of pre-World War America by the Walt Disney Company. 36, 37, 38

In contrast, in the context of P.R. China, instead of gathering together because of shared values, beliefs or pursuits, people would choose to live in the same community that is defined by spatial divisions, which is kind of a place-based definition. For instance, in the book of Rowe and his colleagues, it is mentioned that "communities in China have been territorially-based groups defined politically for the purposes of administration and the mutual extension of rudimentary basic social support".³⁹

In a word, while a community in U.S. is more like a gathering of similar ideologies, in which people do not necessarily have to live together but connected by similar mental values or beliefs, residents in China are generally living in the same community because of their similar jobs during the work-unit period (1949-1980s) or their capacity to buy a house during the

³⁵ Krieger, 2019.

³⁶ Rymer, Russ. "Back to the Future: Disney Reinvents the Company Town. (Celebration, FL)." *Harper's Magazine* 293, no. 1757 (1996): 65.

³⁷ Pollan, Michael. "Town-Building Is No Mickey Mouse Operation." *The New York Times Magazine*, 1997.

³⁸ Goodnough, Abby. "Disney Is Selling a Town It Built to Reflect the Past." *New York Times (1923-Current File)*. 2004.

³⁹ Rowe et al., 2016.

commodity housing period (1990s-), which is enclosed together through physical forms. Thus, in this research, the work-unit community in P.R. China is prescribed as a physically restricted living quarter, in which residents are generally gathered together more because of their jobs during early Socialist China than similar values or beliefs.

1.1.3 Work-unit community

One *Danwei* or Work-unit is mainly composed of two quarters: the working quarter and the living quarter. Most researchers would name *Danwei* as *Danwei*, *Danwei* compound or *Danwei* community without differentiating the working quarter and the living quarter. However, since this study mainly focuses on the living quarter of *Danwei*, for clarification, in this research, *Danwei* would be named as "work-unit" in an international context. And work-unit or work-unit compound would be regarded as the combination of the working and the living quarter while the living quarter of one work-unit would be named as the work-unit community. Besides, even though the economic reform started in 1978, the construction of the work-unit community actually lasted until 1988, when experiments on housing reform were finished officially. To be more accurate, the material distribution of the public housing was not totally stopped until 1998 in the country. During the transitional period, the work-unit might stop constructing housing themselves, however, they would buy the commodity housing from real estate developers and continue distributing them to workers as a welfare.

1.2 Definition of "Separation"

In this research, the separation of the working quarter and the living quarter is regarded as an important turning point when analyzing the evolution of the work-unit community, both the administrative and morphological evolution included. Thus, it is quite necessary and important to clarify the definition of the separation at the beginning.

First, it should be notified that the separation of the working quarter and the living quarter in different work-units does not occur at a unified time. In reality, it is a quite complicated and lengthy process and situations may vary from one work-unit to another, which is also the embodiment of the complex reform process of the work-unit system in the country. However, it is widely accepted that the work-unit system reform includes changes in multiple aspects. And it will be helpful to understand the complicated separation process within the work-unit by clarifying these different aspects. In fact, different scholars have summarized and analyzed the changes of different aspects within the work-unit system from their respective professional perspectives. For instance, from the perspective of economics, Liu maintains that the stateowned enterprise assets include the productive assets and non-productive asserts, and for the latter one, some are visible, including housing, hospitals, schools, shops and other welfare facilities that serve the employees, while others are implicit, such as the pension, medical care, the unemployment insurance that are with the nature of insurance accumulation. ⁴⁰ From a sociological perspective, Wang and Li claim that changes in the work-unit system actually include changes of the labor and employment system, the housing distribution system, and the work-unit welfare system. And they believe that the housing system reform is one of the most important contents of work-unit system changes and is also an important mechanism of the evolution of the traditional work-unit community.⁴¹

In consideration of the focus of this study, changes in different aspects along with the reform of the work-unit system will be screened and divided into two categories, namely, the

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⁴⁰ Liu, Qinghao. "Ecological Mechanism of Urban Morphology (in Chinese)." *City Planning Review*, no. 2 (1995): 20–22.

⁴¹ Wang, Meiqin and Li, Xueying. "The Urban Housing System Reform and the Bottom of Traditional Unit Community (in Chinese)." *Shandong Social Science*, no. 4 (2011): 80–85.

administrative change and the morphological change. The former mainly refers to changes of the property management of the work-unit community, which includes the management and maintenance of almost all visible aspects within the community before the reform, such as housing, public service facilities and the public space, while after reform it mainly refers to the management and maintenance of public sectors in the work-unit community. The morphological one includes the changes of the material spatial morphology and the immaterial social morphology. To specify, the material spatial morphology mainly include the housing and public service facilities constructions, and the physical performance of the public space and facilities in the living quarter. The immaterial social morphology mainly includes the population composition and the property rights. Thus, the separation in this research will also be defined based on these two aspects. In a word, the separation in the work-unit community mainly includes two kinds of key turning point.

First, it is widely accepted that the housing reform has played a significant role in the evolution of the work-unit community, which began in the early 1980s and ended officially in 1998 after series of experiments. Before the housing reform, a housing distribution model named as the distribution system of physical welfare is adopted, in which the government allocates the land free of charge, the work-unit pays for the construction of the housing, and then allocates it to the staff. The work-unit only charges a very low rent, which is deducted from the salary of the staff by the work-unit every month, and the responsibility for the management and maintenance of the housing is also borne by the government and the work-unit.⁴² Then through the transformation of the housing ownership from the state and the work-unit to the workers, the reform of the housing system has brought about the recognition of property rights and the

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⁴² Wang, Meiqin. "The Trend of Unit Community Under the Pattern of Urban Residential Space Differentiation (in Chinese)." *Journal of Suzhou University (Philosophy & Social Sciences)*, no. 6 (2010): 6–9.

freedom of choice of residence, which has led to the hybridization of traditional work-unit communities. 43 Thus, the official end of the welfare housing distribution in 1998 is regarded as one of the key time nodes for the separation in this research, especially when it comes to the property right changes of the housing in the living quarter and the population composition changes under the category of the social morphological evolution. Also, in principle, there should be no more welfare housing constructions by the work-unit after 1998. However, based on field investigations, it must be pointed out that what is described above is just the time nodes set by the state at the national policy level. In reality, the situation in different work-unit communities are varied and complicated. For instance, in terms of the housing welfare benefits, although the state has officially ended the welfare housing policy in 1998, due to the emergence of some explanatory contents and provisions, some work-units can continue to provide housing for enterprise workers under the terms of "fund-raising housing" and "economic and comfortable housing" to the extent permitted by the national policy, even if the provident fund has long been standardized and institutionalized.⁴⁴ In Case 3 (#1XC) in this study, for example, the new company formed by restructuring the original logistic department of the factory is still involving in the housing construction in the work-unit community today, only adopting different allocation methods for employees who join the factory before and after 1999.

Second, not as clear and intuitive as the results of the housing reform, the reform of the property management other than the housing and public service buildings is quite complex and difficult, which covers the management of almost all the public sector in the community, such as the parking management, garbage collection, security and monitoring, greening and open space

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⁴³ Wang and Li, 2011.

⁴⁴ Hu, Shui. "The Transformation and Mutation of the Work Units Welfare- A Case Study on the State-Owned Enterprise in the Northeast China (in Chinese)." Doctoral Dissertation, Jilin University, 2015.

maintenance. In fact, although in principle the work-unit has withdrawn from the property management of the work-unit community a long time ago, for most work-unit communities, there are no professional institutions that are willing to take over, which leaves a gap in the property management of the work-unit community. Nevertheless, it is exactly during this gap period that the power of the self-organizing is the most obvious and diversified with the involvement of multiple and complex management crowds.

The government's concern about the property management in the work-unit community can be reflected in a national policy that is issued in 2016, namely, "Guiding Opinions on the Separation and Handover of 'Three Supplies and One Management' (sangongyiye) in the Living Quarter of State-owned Enterprises" ([2016] No. 45), which was issued in 2016 by the State-owned Assets Supervision and Administration Commission of the State Council (SASAC) and the Ministry of Finance and it explicitly requires that:

Starting in 2016, the country will comprehensively promote the separation and handover of the 'Three Supplies and One Management' in the living quarter of state-owned enterprises (including central enterprises and local state-owned enterprises), and hand them over to specialized enterprises or institutions, which would adopt the socialized management mode. The process should be basically completed before the end of 2018. From January 1st, 2019, state-owned enterprises will no longer bear relevant expenses for the 'Three Supplies and One Management' of the employee's living quarter in any way.⁴⁵

In this guidance, "Three Supplies" refers to the water supply, power supply, and heating (gas) supply, and "One Management" refers to the property management of the work-unit community. For most work-unit communities today, "Three Supplies" have basically been handed over (*luodi* in Chinese, which means landing) to specialized enterprises and managed in a

http://www.gov.cn/zhengce/content/2016-06/22/content 5084288.htm.

⁴⁵ "Notice of the General Office of the State Council on Forwarding the Guiding Opinions of the State-Owned Assets Supervision and Administration Commission of the State Council and the Ministry of Finance on the Separation and Handover of the 'Three Supplies and One Management' in the Living Quarter of State-Owned Enterprises Government Information Disclosure Column." Accessed April 28, 2021.

socialized mode. Specialized enterprises or institutions have begun to take charge of the supply, charging and maintenance of the water, power, and heating (gas) within the work-unit community. And the work-unit has withdrawn and was no longer responsible for these matters. However, the transfer of "One Management" is much more complex and it is much more difficult to be handed over thoroughly and quickly.

Anyway, in reality, there is no specific time for the handover of the property management in different work-unit communities and the evolution of different work-unit communities may have different turning points based on this point. Some may even have several different turning points after the national housing reform ended in the late 1990s. For instance, in this research, in Case 1 (XNVC), the biggest change of the property management occurred after the geographical relocation of the working quarter in 2015, after which the community was caught into an obvious chaos. Thus, 2015 is deemed as another key turning point in the evolution of XNVC. In Case 2 (ISSC), in which the working quarter is still in its original location, the Institute has been the main role player in the management of the community before 2010, a non-professional property management company began to settle in in 2010, which undertook only the management function instead of the normal service function in the community. In 2015, the property management office of the street office took over the job because of the adjustment of districts. Then in August 2020, a professional property management company began to settle in the community, which is a property management company in the real sense and is responsible for the maintenance of almost all the public space of the community. Thus, for Case 2, there are three more key turning points after the national housing reform ended, namely, 2010, 2015 and 2020. As for Case 3, similar to Case 1, the working quarter moved to a new site geographically in 2003. Despite of this, the relocation was not a particularly critical turning point for the

management of the community. Instead, the arrival of one property management company in 2015 is one. Besides, in 2010, the Factory was reorganized into two independent companies, which can be deemed as another key turning point. Last but not least, around 2000, the local government's influence in #1XC began to be strengthened. Therefore, for Case 3, the three key turning points after the national housing reform ended include 2000, 2010, and 2015.

In summary, in this research, the official end of the national housing reform in the late 1990s is deemed as one common key turning point for all the three work-unit community cases. After that, however, different work-unit communities might have different critical turning points, depending on their own development trajectories. Therefore, the separation adopted in this research is actually a quite complicated and lengthy process for each case work-unit community. That is, the separation of the work-unit community in a practical sense starts from the official end of the national housing reform in the late 1990s and then is marked by one or several key turning points. The whole process can be regarded as the separation. In fact, for many work-unit communities, the separation is still ongoing. (Please refer to Section 4.3 for details)

1.3 Research Purpose and Significance

1.3.1 The dissociation of the working and the living quarter

It has to be admitted that the work-unit system had indeed played a significant role and effectively promoted the economic growth during the planned economy period in P.R. China, despite of its oversight on the housing development, which was thought to be non-productive. However, as the domestic and international environment changed around the 1980s, the Reform and Opening-up policy put forward in 1978 initiates the reorganization of the economic system in the country. As described earlier, a system of socialist market economy with Chinese characteristics was adopted to replace the original planned economic system. Correspondingly,

the work-unit system was regarded as an impediment to the rapid economic growth in the transitional China. The free land provision and the material distribution of housing as welfare were both banished. More power was devolved to local governments and new economic order was created. Most work-units had to face with reorganization, relocation, or even demolishment after the 1990s, and large numbers of enterprises were relocated to the suburb. Yet, the relocation or demolishment of working quarters does not mean the relocation of living quarters. Actually, most of the work-unit workers are still resident in the original living quarter of the work-unit despite of the vanish or relocation of the working quarter. And the living quarter has been faced with the lash of free market economy, policy changes, rapid urban development, demographic changes and physical deterioration since then.⁴⁶

1.3.2 The lag of the work-unit community development

Ever since the reorganization of work-units in the 1990s, many researchers have been studying its transition in P.R. China, including the spatial form as well as the *Danwei* system. However, most of them are analyzing the work-unit as a whole, and generally centered on working quarters' transformations, rather than work-unit community changes. For example, Chai has studied the *Danwei*-based Chinese cities' internal life-space structure by using Lanzhou city as a case, which focuses on living patterns of work-unit residences on three levels. ⁴⁷ Qiao has studied the history evolution of Beijing work-unit and its effects on urban space. ⁴⁸ Bray illustrates the work-unit (*Danwei*) system from origins to reform from the perspective of social

⁴⁶ Chai, Yanwei, Chen, Lingji, and Zhang, Chun. "Transformation of Danwei System: An Angel of View on City Changes in China (in Chinese)." *World Regional Studies* 16, no. 4 (2007): 60–69.

⁴⁷ Chai. 1996.

⁴⁸ Qiao, 2004.

and political views. 49 By taking industrial sites in Xi'an as examples, Yin, et al. introduce the spatial and function transformation of industrial districts under the transfer from planned economy to market economy in China.⁵⁰ After analyzing the origins, physical and social features of P.R. China's work-unit, Lu examines transition of the work-unit from an enclosed entity to a more fluid space and the conflicts generated by this process through a case study of a research institute located in Beijing in Chapter 7 of her book.⁵¹ Taking Beijing No. 2 Textile Factory as a case, Zhang, et al. have studied its spatiality and spatial changes since its construction in 1957, figuring out the function replacement, land use changes, boundary ablation, the socialization and externalization of internal facilities, and the hybridity of property rights and community residents that has happened in the work-unit.⁵² Zhang and Chai has explored the spatial dynamic of workunit based on spatial morphology and land use changes by taking Tongrentang pharmaceutical factory in Beijing as an example.⁵³ Years later, they published another English paper. By taking Tongrentang as an example, they describe how the community changed from gated, boring, solidified and strictly constrained work units to un-gated, vibrant, mixed-use and flexible urban neighborhoods through archival material and interviews.⁵⁴ Wang and Liang have analyzed the

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⁴⁹ Bray, 2005.

⁵⁰ Yin, Huaiting, Shen, Xiaoping, and Zhao, Zhe. "Industrial Restructuring and Urban Spatial Transformation in Xi'an." In *Restructuring the Chinese City: Changing Society, Economy and Space*, Ma, L.J.C. and Wu, F. (Ed.)., 155–74. London; New York: Routledge, 2005.

⁵¹ Lu, 2006.

⁵² Zhang, Yan, Chai, Yanwei, and Zhou, Qianjun. "The Spatiality and Spatial Changes of Danwei Compound in Chinese Cities: Case Study of Beijing No.2 Textile Factory (in Chinese)." *Urban Planning International* 24, no. 5 (2009): 20–27.

⁵³ Zhang, Chun and Chai, Yanwei. "The Spatial Dynamic of Danwei Community in Transitional Urban China: Spatial Response and Land Use Renewal (in Chinese)." *Urban Planning International* 24, no. 5 (2009): 28–32.

⁵⁴ Zhang, Chun, and Chai, Yanwei. "Un-Gated and Integrated Work Unit Communities in Post-Socialist Urban China: A Case Study from Beijing." *Habitat International* 43, no. C (2014): 79–89.

morphology evolution of three different types of work-unit in Dalian, namely, educational, military and medical ones, and concluded four evolution modes of the work-unit based on the analysis. ⁵⁵ Xiao and Chai works on the spatial morphology evolution of one work-unit in Beijing from the perspective of property right practice. ⁵⁶ Li has finished his dissertation on the relevancy between *Danwei* compound and urban physical spatial form by using Nanchang, P.R. China as an example. In the thesis, he has studied the structural relationships between *Danwei* and urban physical spatial form from three hierarchies, including the associations between *Danwei* compound space and the development of the urban space, the structural relationships between Danwei compounds and the organization of urban physical spatial form, and the influences which *Danwei* compounds exerted on urban public space. ⁵⁷ While admitting the comprehensiveness and the relevance to this research of his thesis, it has to be admitted that his concentration is more about the significant influences that the work-unit works on the large-scale urban space, not the other way around, and the thesis does not differentiate the working quarter and living quarter either.

Some researchers are working on housing issues in P.R. China, which are closely related to the work-unit community because of the importance of housing in the work-unit community and the significant role of work-unit housing among Chinese housing. In her dissertation, Xiong has done a research on the typology of Chinese urban collective houses from 1949 to 2008,

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⁵⁵ Wang, Le and Liang, Jiang. "The Analysis of the Urban Form Transformation Models of the Unit Community (in Chinese)." *Huazhong Architecture* 28, no. 7 (2010): 151–54.

⁵⁶ Xiao, Zuopeng and Chai, Yanwei. "The Property Practice and Physical Space Evolution in Danwei Compound: A Case in Beijing." *Urban Development Studies* 21, no. 4 (2014): 105–12.

⁵⁷ Li, Chen. "Relevancy Between Danwei Compound and Urban Physical Spatial Form of Nanchang, China (in Chinese)." Doctoral Dissertation, Southeast University, 2016.

which includes large amount of work-unit housing.⁵⁸ She has divided the development of urban collective housing into seven different time periods and focused on the changes of five basic elements in housing over time, including bedroom, hall, kitchen and bathroom, façade, and structure and equipment. Then she uses Beijing as a case and lists different housing plans in different years. Her use of *Architectural Journal* as a major data resource is a brilliant illumination, which was founded in 1954 and contains lots of historical data about community and housing in the country. In a word, her research is concentrated on housing standards of P.R. China in different years, not the evolution trajectory of specific work-unit communities, housing included. Liu has discussed the interrelationship between the extension of urban built-up area and the formation of residential space in Nanjing's recent 60 years, which is describing the residential space development at a city level.⁵⁹

There are certain, but very few, researches that are treating the work-unit community as an independent study object. Mao and Chai has investigated Maofangnan community in Beijing, for instance, from the perspective of governance modes. By focusing on living quarters of two work-units in Nanjing, Shi etc. has examined their evolutions on property rights, residences compositions, spatial layout and supporting services, which is a valuable reference to this

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⁵⁸ Xiong, Yan. "The Typological Research of Chinese Cities' Collective House (1949-2008)- Case Study on Types of Beijing Collective House (in Chinese)." Doctoral Dissertation, Huazhong University of Science and Technology, 2010.

⁵⁹ Liu, Kun. "The Extension of Urban Built-up Area and the Formation of Residential Space in Nanjing City's Rencent Sixty Years (in Chinese)." Master's Thesis, Southeast University, 2011.

⁶⁰ Mao, Zidan and Chai, Yanwei. "The Evolution and Direction of Community Governance in China's Danwei Community: A Case Study of Maofangnan Community, Beijing (in Chinese)." *Urban Studies* 20, no. 3 (2013): 17–22.

study.⁶¹ But their researches are limited to the community level at most, and more about the property right changes instead of spatial morphological changes.

In summary, most relevant studies are either about the work-unit without differentiating the working quarter and living quarter and generally the former weighs much more than the latter or concentrating on housing issues only. Only a few studies are treating the work-unit community as an independent object from the work-unit or its working quarter. Even though some researchers have involved the work-unit community unconsciously, they are either in small-scale, like housing, or in large-scale, like urban space.

As a matter of fact, there are underlying reasons for the lag in the research on the development of the work-unit community in the academic field. Ever since the 1990s, working quarters of work-units have been being the concentration because of its importance in the economic transformation process of P.R. China. From political policies, economic support, to social inclination, the whole country has realized the urgency to reorganize the work-unit space, especially those polluting heavy factories. However, the concentration is mostly on working quarters of these work-units.

Besides, when it comes to the housing market in P.R. China, during the early time of the economic reform, while the old urban core built before 1949 has gained developers' interest because of the high land value gap due to its location, and the out suburb too because of the possibilities to gain large parcels of land with relatively low price, the middle zone of work-unit area has basically been abandoned. Compared with the political urgency and economic operability of working quarter transitions, the living quarter lacks both policy and economic

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⁶¹ Shi, Jie, Song, Yujia, and Kong, Linglong. "From Planning Economy to Market Economy- Research on the Transformation of Nanjing Enterprise and Institution Compound During the Transition Period (in Chinese)." In *Annual National Planning Conference 2013*, 2013.

support. It was deemed that the redevelopment of the work-unit community was low-profit because of the high compensations to occupiers, inferior locations compared with the old urban core, and the deteriorated environment, which in fact facilitated a concentric development in most Chinese cities. 62, 63, 64, 65

All in all, with the diminishing of the work-unit system, the work-unit space is going through gradual transitions. While the dissociation of living and working quarters is happening in work-units, there is a lack of comprehensive study on the work-unit community itself from different levels, and the work-unit community development is far left behind. Most researches are still mixing the working and living quarter together and the former is generally the concentration, which leaves a blank in the research of the work-unit community redevelopment.

1.3.3 The necessity of the retrofitting of the work-unit community

Now, forty years have passed since the 1978 Economic Reform in P.R. China. The urban economic and spatial structure of Chinese cities has been changed dramatically, especially after the housing reform in 1982-1988 and the land reform in 1987.^{66, 67, 68} Several factors make it

⁶² Wu, Fulong, and Yeh, Anthony Gar-On. "Changing Spatial Distribution and Determinants of Land Development in Chinese Cities in the Transition from a Centrally Planned Economy to a Socialist Market Economy: A Case Study of Guangzhou." *Urban Studies* 34, no. 11 (November 1, 1997): 1851–79.

⁶³ Sit, Victor. "A Window on Beijing: The Social Geography of Urban Housing in a Period of Transition, 1985-1990." *Third World Planning Review* 22, no. 3 (2000): 237–59.

⁶⁴ Wang, Ya Ping, and Murie, Alan. "Social and Spatial Implications of Housing Reform in China." *International Journal of Urban and Regional Research* 24, no. 2 (2000): 397–417.

⁶⁵ Li, Si-Ming, Quan Hou, Susu Chen, and Chunshan Zhou. "Work, Home, and Market: The Social Transformation of Housing Space in Guangzhou, China." *Urban Geography* 31, no. 4 (May 1, 2010): 434–52.

⁶⁶ Wu and Yeh, 1997.

⁶⁷ Ma, Laurence J. C., and Fulong Wu. *Restructuring the Chinese City: Changing Society, Economy and Space*. London; New York: Routledge, 2005.

⁶⁸ Lin, George C. S. "China's Landed Urbanization: Neoliberalizing Politics, Land Commodification, and Municipal Finance in the Growth of Metropolises." *Environment and Planning A* 46, no. 8 (2014): 1814–35.

possible to start thinking about the redevelopment of work-unit communities today. First of all, the great economic situation and high-speed development in P.R. China have made the scarcity in early socialist era a history. The governmental budget could be available to help with the work-unit community redevelopment. Second, the urban sprawl has made the original inferior location of work-unit community area a big advantage, which means the original peripheral location has become the central one today. Last but not least, under the new economic and political backgrounds, most cities in China will turn to the development stage of stock-based development or the coexistence of increment and stock-based development in the following Thirteenth Five-Year period (2016-2021). The problem of urban renewal and reconstruction has become a long-term important task, and urban construction will be problem-oriented and aiming at structural optimization and quality improvement in the already built-up urban area. Among those "stocks" in Chinese cities, the work-unit community undoubtedly is occupying a significant role and with a high potentiality to be retrofitted.

In the meanwhile, the retrofitting of old work-unit communities meets certain social requirements in today's China. First, the requirement of a stable social development. In today's information age, the transmission of news and messages is fast and wide-ranging. The retrofit of extant work-unit communities could better gain pubic support and promote the stable development of the society. Second, the requirement of sustainable development. Most work-unit communities were constructed with a lower standard, which consist of lots of high energy consumption buildings. While these buildings are still in their service life, it is obviously a waste of resources and a re-destruction of the environment if adopting a large-scale demolition and reconstruction policy. The retrofitting, instead, could not only saves energy but also reuses

⁶⁹ Li, 2016.

resources. Third, the requirement of residents' living mode. For instance, they hope to increase the living area, improve the environment and landscape features in the community, gain more entertainment and leisure space. Fourth, the requirement of demographic composition changes. Especially, the elderly's requirement for the accessibility design. Fifth, the requirement of cultural continuation. Through the renovation and renewal of existing communities, rather than large-scale demolitions, it is helpful to maintain the continuity of regional culture.⁷⁰

All in all, the three factors imply that there now exists a viable housing stock in the work-unit community ring and it would be enforceable to retrofit them now. The five requirements mean that there is a strong and urgent need to retrofit this precious treasure of history.

1.3.4 A new perspective on the work-unit community study

1) The tradition of gated community in China

Of all the characteristics of China's urban communities, gated-community is a significant one. The majority of these communities are enclosed by walls or fences. When it comes to the long history of gated communities in China, scholars would like to adopt the three-stage divisions: feudal imperial period, early years of P.R. China before the economic reform and contemporary China.

a. Imperial traditions of ancient China

The first official regulations about the city planning in ancient China was the Record of Examination of Craftsman (*kaogong ji*) that could be found in the book *Rites of the Zhou* (*zhouli*). In the record, a diagram was introduced as the standard construction mode. In a walled square plot of nine *li* (equals 4500 square meters) in length, there should be three entrances/exits at each side. Inside the city, the most important palace was situated in the center and surrounded

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⁷⁰ Yi, Li. "The Existing City Residential Area Renovation Research Based on Self-Organization Theory (in Chinese)." Master's Thesis, Xiamen University, 2013.

by high walls. The rest place was divided by nine longitudinal and nine latitudinal roads and each part was attributed separated and strict functions. Even though there were no actual cities that perfectly fit the diagram, it was the first record that illustrated what an ideal city should be in ancient China and the prototype of gated living habit could be found in the planning, which fundamentally was the manifestation of the pursuit for the security of the imperial authority. However, the specific planning of resident district was not introduced in the record. Among the ancient imperial cities, Chang'an city (modern Xi'an) may be the most typical one. From the unification of Qin and Han Dynasty to the golden age of Tang Dynasty, Chang'an had been a preeminent city in ancient China and probably in the world, with a population surpassing one million people.⁷¹ Organized in a square rectilinear grid, the city was divided into 108 walled wards, which were all gated and locked at night.⁷² Besides, the market at this time was also surrounded by walls, especially the main East and West Markets.

Nonetheless, as mentioned earlier, the degree of enclosure varied over time. An important change happened in Song Dynasty, when there was a "disappearance of the enclosed marketplace, along with the walled-ward system, and their replacement by a much freer street plan in which trade and commerce could be conducted anywhere within the city or its outlying suburbs.". 73 In reality, this period was generally regarded by some Chinese historians as the "sprout of capitalism" period, only to be thwarted by invasions of the Mongols and later, Western powers.⁷⁴

⁷¹ Stokols, 2017.

⁷² Xu, Yinong. The Chinese City in Space and Time: The Development of Urban Form in Suzhou. Honolulu: University of Hawai'i Press, 2000.

⁷³ Skinner, G. W., and Baker, Hugh D. R. *The City in Late Imperial China*. Stanford, Calif., 1977.

⁷⁴ Stokols, 2017.

Then during Ming and Qing Dynasty (1368-1644), Beijing was established as the capital of the dynasty. Similar to principles regulated in *kaogong ji*, it was strictly orthogonal, laid out on a grid, with enclosed ward neighborhoods and gates. Also, it was the manifestation of imperial governor, which served the authority well. However, with the invasion of the Western powers and the outbreak the War of Resistance Against Japan and the Civil War, China went through a dark period that full of chaos and turmoil. Then the Communists came to power and began reconstructing the cities and, in the meanwhile, redistributing the land ownership from the private landlords, trying to end the feudal system and serve the public better.

b. The work-unit (*Danwei*) in early socialist China

Since the work-unit has been introduced clearly in Section 1.1, the author will not repeat it here. Anyhow, during the first three decades after the foundation of P.R. China, the work-unit was adopted as an efficient and common practice to improve workers' productivity through a proximity arrangement of the working and living space and a welfare system to guarantee workers' living environment, under which political, social and economic purposes could be achieved through the central control of the government. And the majority of them were enclosed and gated. As mentioned earlier, however, the enclosed work-unit inherited a lot from the imperial China in many respects, but it was also influenced by the Soviet mode, the Yan'an Base system, the reform of the Republic of China system and the legacy of workers' struggle. Then with the weakening of the state control and the appearance of the socialist market economy, this kind of self-sufficient unit was abandoned and lots of new commodity housing has been developed on the periphery of the work-unit area.

c. The gated commodity community (*Shequ*) in contemporary China

With the introduction of the economic reform in 1978 led by Xiaoping Deng towards the socialist market economy and the opening up to the foreign investment, the work-unit system was gradually dismantled.⁷⁵ And a new type of community appeared, named as *Shequ*, which could be translated into gated commodity community since they are generally gated with walls or fences, just as in imperial China and early socialist P.R. China.

The goal of the new commodity community design was to "promote attributes like social cohesion (*ningjuli*), neighborliness (*linli guanxi*), and feelings of security and belongs". And the continuity of the gated culture is reasonable to some extent in contemporary China. The gated large-scale communities do have some advantages: (1) a safe and quiet walkable environment can be created inside the gated communities; (2) the saved traffic space can be used as "citizen spaces"; (3) less arterial roads means less noise, even pollution; and (4) by devolving the responsibilities of communal amenities and services to real estate developers, the government can save certain amount of budget on the public investment. On the other hand, however, there are serious problems caused by these gated communities, such as the traffic jam, single function, isolated islands, less connection to the city, inside is fine while outside is bad and the inconvenience for residents to get outside services.

Many researches have claimed the continuity of gating from the work-unit to the commodity housing and the rightness of gated commodity communities, or the side effects of

⁷⁵ Rowe et al., 2016.

⁷⁶ Bray, 2005.

⁷⁷ Kan, Har Ye, Forsyth, Ann, and Rowe, Peter G. "Redesigning China's Superblock Neighbourhoods: Policies, Opportunities and Challenges." *Journal of Urban Design* 22, no. 6 (2017): 757–77.

⁷⁸ Rowe et al., 2016.

gated communities. ^{79, 80, 81, 82, 83, 84} Some of them are also trying to figure out certain relationships between the work-unit community and the gated commodity community. By categorizing gating into three elements, namely, gated minds, lives and physical forms, Xu illustrates the gated community by a comparative study of physical, cognitive, and social forms of one work-unit community and one commodity gated community and concludes that the physical form of the work-unit community is actually becoming more porous while the ways of living is still gated, and that residents living in the gated commodity community are in reality with gated ways of living and thinking, and also gated physical forms. ⁸⁵ Wu maintains that the function of gating is dependent upon social and economic contexts through the analysis of work-unit compounds and commodity housing enclaves: under socialism, gating reinforces political control and collective consumption organized by the state, and in the post-reform era, the gate demarcates emerging consumer clubs in response to the retreat of the state from the provision of public goods. ⁸⁶

79 Yu. Ving "Narrating Gatedness

⁷⁹ Xu, Ying. "Narrating Gatedness in Urban China: A Comparative Study of Physical, Cognitive, and Social Forms of the Work Unit and the Commodity Gated Community." Doctoral Dissertation, University of Michigan, 2015.

⁸⁰ Wu, Fulong. "Rediscovering the 'Gate' Under Market Transition: From Work-Unit Compounds to Commodity Housing Enclaves." *Housing Studies* 20, no. 2 (2005): 235–54.

⁸¹ Low, Setha, and Huang, Youqin. *Is Gating Always Exclusionary? A Comparative Analysis of Gated Communities in American and Chinese Cities*, 2008.

⁸² Breitung, Werner. "Enclave Urbanism in China: Attitudes Towards Gated Communities in Guangzhou." *Urban Geography* 33, no. 2 (2012): 278–94.

⁸³ Staub, Alexandra, and Yu, Qingyang. "The 'New' Gated Housing Communities in China: Implications for Urban Identity | ARCC Conference Repository." In *ARCC Conference Repository*, 2014.

⁸⁴ Lu, Tingting, Zhang, Fangzhu, and Wu, Fulong. "Place Attachment in Gated Neighbourhoods in China: Evidence from Wenzhou." *Geoforum* 92 (2018): 144–51.

⁸⁵ Xu, 2015.

⁸⁶ Wu, 2005.

All in all, the gated community in P.R. China does have a long history and people are more inclined to live in "walls".

2) Open community

On 22nd, February 2016, the State Council of P.R. China proposed "Several Opinions" on further strengthening the management of urban planning and construction, of which the original purpose is to solve the layout problem of transportation network and adopt the idea of "narrow roads and a dense network of street".⁸⁷ While the traffic issue is the focus of the guideline, the concept of open community was officially introduced to the public for the first time in P.R. China. In contrast with traditional gated communities, open community is quite a fresh and challenging idea in the country.

As mentioned in Section 1.1, community in P.R. China is a place-based definition. The majority of these territorially-based communities are gated and there are multiple cultural, political, economic and social reasons for the gated tradition in the country. Thus, for Chinese, openness means danger and encircling themselves with defenses is a deep-rooted notion. In his book, Li stated that Chinese micro-districts emerge from a common pursuit of safety and interdependence.⁸⁸

Open community could also be named as un-gated community, which is a concept under the community category opposite to gated. In reality, "Several Opinions" has sparked heated discussions and arguments in Chinese society regarding to the open community ever since its announcement. Professional and non-professional opinions have been emerging one after

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⁸⁷ "Several Opinions of the Central Committee of the Communist Party of China and the State Council on Further Strengthening the Administration of Urban Planning and Construction_ Relevant Documents of the Central Government_ China Government Website." Accessed April 28, 2021. http://www.gov.cn/zhengce/2016-02/21/content_5044367.htm t=t.

⁸⁸ Li, Shiqiao. *Understanding the Chinese City*. London: SAGE Publications Ltd, 2014.

another. After all, living is an inseparable section for everyone and thus everyone is qualified to express his/her own idea about this issue. Apart from this, as described above, open community is quite a fresh concept for Chinese when compared with the long-existing traditional gated community in Chinese culture. Also, another significant reason to intensity this discussion is the ambiguity of the concept itself despite of the many existed researches. For instance, when comes to gated measures, is one community gated physically, legally or literally? Is the openness applied to only local residents or to the general public? Moreover, the openness of one community is relative. Should we move away the walls or fences totally, or only add more entrances and exits to improve the permeability of the gated community, or simply remove the original gates to make the interior roads public? Besides, different kinds of communities were built in different years under different policies. The degree and specific measures to deal with different communities built in different eras have to be considered cautiously.

With the time passing by, the heat of the discussion has been fading gradually and seemingly, gated has defeated open. However, the historical discussion of the whole society has indeed offered a new perspective for researchers to study work-unit communities. From the perspective of open and gated communities, this research finds it is of great significance to study the evolution trajectory of surviving work-unit communities from the beginning to the present, physically and socially, especially its inherent vitality and the interrelationship to the surrounding urban environment. Are they still firmly gated as in the beginning, or are they merging themselves into the city slowly under the country's economic development background in their own ways, or as claimed in this research, in a self-organizing way?

1.4 Research Questions

The research questions of this thesis include:

- 1) Taking the separation of the working quarter and the living quarter as key turning points in the evolution of the work-unit community,
 - a. how have the administrative modes of specific work-unit communities in Nanjing evolved over time?
 - b. how have the morphological elements of specific work-unit communities in Nanjing evolved over time?
- 2) Does the evolution of work-unit communities from their initial form to their present arrangement present a self-organizing pattern? If yes, is the process a success or a failure? What kind of retrofitting strategies can we generalize from these different evolutionary trajectories, and hopefully promote, maintain or perfect the self-organizing process?

1.5 Methodologies

1) Literature research and web search

In this research, the national level data, which acts as the background of the evolution of specific case work-unit communities in Nanjing, can be collected through the web search and the literature research. For relevant political backgrounds and housing-related policy changes, the information is open to the public and can be retrieved through the web search. For typical types of housing and communities constructed under the provisions of national standards over time, the data can be gained with the help of *Architectural Journal*, which is a monthly Chinese architectural journal that was founded in 1954 and contains lots of drawings about community and housing design, as well as certain promulgated policies and regulations on housing and community constructions in the country over time.

Besides, at the Nanjing city level, to guarantee the inclusiveness of samples when selecting specific work-unit community cases, two criteria are adopted - the type of the work-

unit that it belonged to and its location in the city. While the type of the work-unit is open to the public, the latter one needs the spatial distribution analysis of communities constructed during different time periods in Nanjing. Luckily, Tang's book on the phenomenon of urban residential differentiation in Nanjing, and Liu's work on the extension of urban built-up area and the formation of residential space in Nanjing's recent sixty years can provide detailed and reliable data about the construction years and locations of different communities that were built from 1949 to 2004 in Nanjing, as well as the expansion process of urban built-up area in the city.^{89, 90} Thus, literature research is also one key method to ensure the feasibility of this section.

2) Field investigation

The focus of this study is on the Nanjing city level. While the background data at the national level, and the spatial distribution data of communities in Nanjing could be gained through the literature research and the web search, the collection of other city level data heavily relies on the field investigation, which is due to the lack of records on the work-unit community evolution both on the web and in related academic researches. Visiting archives and questionnaires are two main ways to collect these data.

To specify, the goal of the field investigation is to gain relevant data to understand both the administrative and the morphological evolution of the case work-unit communities in Nanjing. Archives undoubtedly is the most reliable resource to gain data about the spatial morphological evolution of the community. As to the social morphological and the administrative evolution, the questionnaire survey is the main tool to collect the needed data, which is basically conducted verbally in consideration of local realities. Two kinds of group are

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⁸⁹ Tang, Xiaolan. A Study on the Phenomenon of Urban Residential Differentiation: A Sociological Analysis of Nanjing Urban Residential Community (in Chinese). Nanjing, P.R. China: Southeast University Press, 2007.

⁹⁰ Liu, 2011.

main participants for questionnaires in this research – residents and administrative staffs. In reality, both groups might offer more or less information about the administrative and morphological changes that have happened in the community. Thus, question lists in the two questionnaires for them are roughly the same. But due to their different focus and understanding of the community, when asking questions in the questionnaires, the focus will be a bit different. For instance, staffs or leaders of related administrative agencies might have a better knowledge about the management mode changes of the community while elder residents can offer more details about the physical changes happened in their living environment, especially when it comes to their own house. (Please refer to the appendix for questionnaires)

3) Typo-Morphology approach

a. Architectural typology, Urban morphology, and Typo-Morphology

"Morphology" is derived from Greek *Morphe* (form) and *Loqos* (logic), which means the logic of composition of form. Morphological concepts are rooted in Western classical philosophy, thinking and empiricism, which consists of two important ideas. One is the analysis process from components to the wholeness. The complex wholeness is considered to be composed of specific simple elements and the analysis method from components to the wholeness is suitable and can help to gain the final objective conclusion. The other one is the emphasis on the evolution of objective things. The existence of things has a chain of being and a historical method can help to understand the complete sequence relationship of the research object, including past, present and future. 92, 93

⁹¹ Liu, 1995.

⁹² Gu, Kai. "Urban Morphology: An Introduction and Evaluation of the Theories and the Methods (in Chinese)." *City Planning Review* 25, no. 12 (2001): 36–41.

⁹³ Li, 2016.

In the early 19th century, geographers, humanists and architects began to introduce the concept of "morphology" in the field of biology and medicine into their research, treating a city as an organism and analyzing its development mechanisms.

In 1928, the American geographer J. B. Leighly officially used "urban morphology" for the first time, which could be considered as a symbol of "urban morphology" being a prominent academic field.⁹⁴ Ever since then, there have been lots of researches on urban morphology in Western countries with multiple fields involved, including architectural history, urban planning, archaeological studies, and urban geography.⁹⁵

In her paper, Moudon figured out two individual figures as seminal instigators of urban morphology: M. R. G. Conzen, a German geographer who migrated to England before the Second World War, first to study and practice urban planning, and then to teach geography; and Saverio Muratori (1910-73), an Italian architect who taught in Venice and then in Rome. Three schools of urban morphology are widely recognized and accepted across the world: Italian Typological School, or Muratori School, or Muratori-Caniggia School, of which Muratori and his assistant Gianfranco Caniggia (1933-87) are lead figures, and later on, Giancarlo Cataldi, Gian Luigi Maffei, Maria Grazia Corsini, Paolo Maretto, Giuseppe Strappa and others continue the Muratori tradition; British Morphological School or Conzenian School, of which Conzen is the founder, and J. W. R. Whitehand is an important successor and formed the famous Urban Morphology Research Group (UMRG) at the University of Birmingham; and Versailles School

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⁹⁴ Han, Dongqing. "The Meaning of Urban Morphology in the Urban Design (in Chinese)." *The Architect*, no. 4 (2014): 35–39.

⁹⁵ Gu, 2001.

⁹⁶ Moudon, Anne Vernez. "Urban Morphology as an Emerging Interdisciplinary Field." *Urban Morphology*, no. 1 (1997): 3–10.

emerged in France in the late 1960s, which is created by architects Jean Castex, Philippe Panera and sociologist Jean-Charles DePaule. 97, 98, 99, 100

By taking the city as an organism, urban morphology study would analyze its constitutions and evolution mechanisms. In a broad sense, urban morphology study includes both material and social aspects in a city. In a narrow sense, it only refers to the material morphology and the spatial characteristics of components in a city. 101, 102

As far as the ontological logic of the material objects in town landscape is concerned, building type analysis and town plan analysis constitute two basic sources of urban morphology ontology research. Based on these two sources, architectural typology originated from Italian architecture and urban morphology originated from historical geography discipline have been developed separately. Chen and Gu have discussed in detail about three research methodologies: architectural typology, urban morphology and typo-morphology, a combination of the two.¹⁰³

In the academic circle, Quincy's definition of type is more acceptable. As Quincy described, "The word 'type' presents less the image of a thing to copy or imitate completely than the idea of an element which ought itself to serve as a rule for the model". Type is the abstract essence and structural principle of buildings, which cannot be copied or simply imitated as the

⁹⁷ Moudon, 1997.

⁹⁸ Han, 2014.

⁹⁹ Deng, Hao, Zhu, Peiyi, and Han, Dongqing. "Operative Urban History: Reading Saverio Muratori's Typomorphology Theory and Design Practices (in Chinese)." *The Architect*, no. 1 (2016): 52–61.

¹⁰⁰ Ning, Feige. "The Organic Renewal of Country Houses Based on Typomorphology- Taking the Valley House of Xinyang, Xinxian as an Example (in Chinese)." Master's Thesis, Southeast University, 2016.

¹⁰¹ Gu, 2001.

¹⁰² Li, 2016.

¹⁰³ Chen, Fei and Gu, Kai. "Western Architectural Typology and Urban Morphology: Integration and Application (in Chinese)." *The Architect*, no. 4 (2009): 53–58.

model. This definition stresses stable features of urban and architectural morphologies. 104, 105 In the mid- 20th century, Neo-rationalists further developed this theory to oppose the monotonous and non-humanization brought by modernism and propagated the respect for local history, culture and real users. Apart from the Muratori- Caniggia School mentioned earlier, there are other representative characters, including Aldo Rossi, Carlo Aymonino, Leon Krier and Rob Krier, Vidler, Moneo and Moudon. Despite of their differences in the understanding and application of type, they all admit that type conveys the city culture and collective memories, and can continue over time, which is not only a spontaneous urban phenomenon, but also an urban and architectural language that could be used in design. 106 Deeply rooted in the Roman interpretation of Italian rationalism, Muratori is interested in treating history as a means of recovering a sense of continuity in the architectural practice. Type, fabric, organism and operative history are the core concepts of his urban morphology theory. ¹⁰⁷ Muratori School believes that history and people's spontaneous consciousness are very important to the development of architecture and urban form. A city is an organism, and each type generated in specific period and region represents local social, technological, economic and cultural requirements of the time. 108

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¹⁰⁴ Chen and Gu, 2009.

¹⁰⁵ Quincy, Quatremere de. "Type." In *Oppositions Reader: Selected Readings from a Journal for Ideas and Criticism in Architecture, 1973-1984*, Hays, K.M. (Ed.). New York: Princeton Architectural Press, 1998.

¹⁰⁶ Chen and Gu, 2009.

¹⁰⁷ Jiang, Zhengliang. "The Pioneer of Italian Urban Morphology: Saverio Muratori (in Chinese)." *Urban Planning International* 30, no. 4 (2015): 72–78.

¹⁰⁸ Chen, Fei. "A New Research Framework: The Application of Urban Typomorphology in China (in Chinese)." *Architectural Journal*, no. 4 (2010): 85–90.

Originated from the German geography discipline in the end of 19th century, British Morphological School or Conzenian School is founded by Conzen. By virtue of studies on the urban tissue evolution of many British towns, Conzen has proposed a serie of methods and terminology that emphasize concepts and analysis. ¹⁰⁹ In his book, he perfected his research and analysis methods and emphasized the attention to detailed analysis of maps and plans. "Instead of working backwards from the present confused picture, our morphological analysis has followed the growth of the plan". ¹¹⁰ Related key concepts include plan unit, morphological period, morphological regions, morphological frame, plot redevelopment cycles and fringe belts. ^{111, 112}

As far as the research route, the architectural typology would frame the analysis from micro to macro: systematically classify urban architecture and urban texture and paying attention to the diachronic evolution of types. Urban morphology, on the other hand, would do morphological analysis from macro to micro: identifying and analyzing morphological regions, morphological units, plan unit, plot and building fabric, and the layout and evolution of buildings within the plot. Despite of the differences in the research route, there are many similarities in the philosophy and methods of the two. 113 There is an agreement that the city or town could be 'read' and analyzed via the medium of its physical form and there is widespread acknowledgment that, at its most elemental level, morphological analysis is based on three

¹⁰⁹ Chen, 2010.

¹¹⁰ Conzen, M. R. G. *Alnwick, Northumberland: A Study in Town-Plan Analysis*. Publication (Institute of British Geographers); No. 27. London: George Philip, 1960.

¹¹¹ Conzen, 1960.

¹¹² Chen and Gu, 2009.

¹¹³ Li, 2016.

principles: First, urban form is defined by three fundamental physical elements: buildings and their related open spaces, plots or lots, and streets; Second, urban form can be understood at different levels of resolution. Commonly, four are recognized, corresponding to the building/lot, the street/block, the city, and the region; Third, urban form can only be understood historically since the elements of which it is comprised undergo continuous transformation and replacement. Thus, form, resolution, and time constitute the three fundamental components of urban morphological research.¹¹⁴

Because of aforementioned similarities of architectural typology and urban morphology, a combined typo-morphology was proposed by Western scholars. 115, 116 "typo-morphological studies" - a term coined by Italian architect Carlo Aymonino- use building types to describe and explain urban form and the process of shaping the fabric of cities. Architects working on Typo-Morphological studies believed that "buildings and their related open spaces are the essential elements of city form" and classified them by type to "explain the physical characteristics of cities". For them, Typo-Morphological approach is rooted in history and the built environment should be treated not as a static object but as one constantly changing in the hands of people living in and using it. 117

Based on the spatial organization principles, typo-morphological method would systematically classify and study the city and its constituent elements, and describe, explain the spatial morphology evolution of the city, with an aim to reveal the inherent law and logic of

¹¹⁴ Moudon, 1997.

¹¹⁵ Castex, Jean, and Panerai, Philippe. "Prospects for Typomorphology." *Lotus International*, no. 36 (1982): 94–99.

¹¹⁶ Moudon, Anne Vernez. "Getting to Konw the Built Landscape: Typomorphology." In *Ordering Space: Types in Architecture and Design*, Franck, K.A., Schneekloth, L.H. (Ed.). New York: Van Nostrand Reinhold, 1994.

¹¹⁷ Moudon, Anne Vernez. "A Catholic Approach to Organizing What Urban Designers Should Know." *Journal of Planning Literature* 6, no. 4 (May 1, 1992): 331–49.

urban morphology evolution. In summary, typo-morphological approach has certain characteristics. First, it considers all scales of the built landscape, ranging from a room, to a building, a plot, a block and street, an urban segment, and the whole city, the region, and so on. Second, it treats the formation of urban form as a dynamic and continuously changing entity, which has a dialectic relationship with its producers and inhabitants. In a word, urban morphology is a continuous process of change.^{118, 119, 120}

b. Typo-Morphological study of the work-unit community

By virtue of Typo-Morphological method described earlier, morphological elements during the evolution of the work-unit community at three levels would be extracted in this research, namely, building level, community level and city level. It should be noted that the first two levels focus on the inner changes of the work-unit community, while the last one is about the outer changes brought by the city. All these morphological changes are related to the community development and meets the feature of typo-morphological approach about different scale studies. Thus, when doing case analysis, all three levels would be considered. Through literature research, field investigations and questionnaire survey, typical morphological elements at the three levels could be extracted.

At the building level, housing would be the focus and six elements would be chosen as the study objects, including bedroom, kitchen and bathroom, hall, façade, structure and floor height.

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¹¹⁸ Moudon, 1994.

¹¹⁹ Fang, Rong. "Form of Streets with Public Life and Their Generative Mechanism- A Case Study of Nanjing (in Chinese)." Doctoral Dissertation, Southeast University, 2013.

¹²⁰ Li, 2016.

At the community level, four categories are chosen, namely, boundaries, the traffic organization, the architectural texture and the public space. Boundaries mainly include walls, gates and street-facing buildings changes. The traffic organization refer to the inner road changes. Architectural texture focuses on the physical layout of community buildings, such as FAR and density. Public space consists of the green space and the open space, and the latter one contains the public square and the business street.

At city level, interrelationships between the work-unit community and surrounding plots, road networks and public space would be studied. Surrounding plots development, especially the redevelopment of the original working quarter if it is adjacent to the living quarter (work-unit community), could affect the work-unit community development. For example, if an adjacent working quarter was redeveloped into a residential district, which used to be the only connection between the work-unit community and the city, the merging process of the work-unit community would be damaged heavily. Road networks refer to city-level roads, and subway or bus lines, all of which may have an effect on residences' lives in the work-unit community. Public space includes public service facilities and open space, which may work as driving factors of the changes in the work-unit community and promote residences to merge into the city.

After specifying different morphological elements, the field study and data collections would be carried out from two aspects. First, the collection of the data at the national level, which includes both the political background and housing-related policies in different years and corresponding physical performances of aforementioned morphological elements at the building level and community level. Second, the study on the changes of morphological elements of specific work-unit communities, including the building level, community level and the city level. It could be seen that the first aspect is actually acting as a background for the second one. In fact,

a standard design was adopted in P.R. China, especially during the work-unit era. The whole country was basically following a national housing design criterion, only with minor adjustments because of local climate or conditions. Thus, by learning about the general evolution trend of different morphological elements at the national level, such as housing units, building facades, community design, etc., it would be easier to deeply understand certain changes happened in and around the case work-unit communities.

In summary, typo-morphology approach contains three key principles. First, type is the abstract essence and structural principle of buildings, and each type generated in specific period and region represents local social, technological, economic and cultural requirements of the time, which conveys the city culture and collective memories, and can continue over time. Second, the approach is rooted in history and the built environment should be treated not as a static object but as one constantly changing in the hands of people living in and using it. Third, the approach would systematically classify and study the city and its constituent elements, and describe, explain the morphology evolution process of the city, with an aim to reveal the inherent law and logic of urban morphology evolution.

Based on these principles, in this research, the existing work-unit community should not be treated as a static object but as one constantly changing in the hands of people who live in and manage it, which also echoes the hypothesis about the existence of the self-organizing power. In this research, the work-unit community's evolution from its completion to the present will be the research object, with the separation of the working quarter and the living quarter as key turning points. Second, the work-unit community can be studied through its constituent elements at different levels. To specify, building level and community level at the national level, and building level, community level and city level at the Nanjing city level, will be adopted as

frameworks for the analysis, with an aim to reveal the inherent self-organizing logic of the work-unit community's evolution. Third, typical types of building and community constructed over time at the national level will be listed and compared, which works as the background of specific work-unit communities' evolution in Nanjing. Also, when analyzing specific work-unit communities in Nanjing, different building types and their evolution over time, such as the extensions and reinforcement will also be extracted and analyzed, which hopefully would represent the abstract essence and structural principles of buildings in specific period and convey the culture, collective memories, as well as the local social, technological, economic and cultural requirements of the time.

4) Self-organization theory

Self-organization theory is a key methodology used in this study. By virtue of it, in addition to the field investigation and analysis of the selected three typical work-unit community cases, whether the work-unit community system meets the preconditions of a self-organizing system, whether its administrative and morphological evolution shows the characteristics of the self-organizing evolution, and how to retrofit the work-unit community based on the self-organization theory can all be judged. Therefore, a detailed and full discussion of the self-organization theory is more appropriate after the three case analyses. (Please refer to Chapter 5). Here is only a brief introduction of the theory.

The founder of "Synergetic", H. Haken, introduced the definition of self-organization, which is more acceptable and recognized in the self-organizing discipline. As he described, "We shall say that a system is self-organizing if it acquires a spatial, temporal or functional structure without specific interference from the outside. By 'specific' we mean that the structure or

functioning is not impressed on the system, but that the system is acted upon from the outside in a nonspecific fashion."¹²¹

And in fact, self-organization theory is not an independent theory, but a group of different theories, which include the "Dissipative Structure Theory" created by I. Prigogine et al., the "Synergetic" created by H. Haken et al., the "Catastrophe Theory" created by R. Thom, the "Hypercycle Theory" created by Eigen et al., and the "Fractal Theory" created by B. B. Mandelbrot, the "Chaotic Theory" created by E. N. Lorenz et al.. Despite of their differences on research objects, they do share one common feature, that is, they all work on the nonlinear complex system or the nonlinear complex self-organizing process. Each theory is actually a methodology, however, as a whole, there should be a unified self-organizing methodology that links them together. ¹²²

1.6 Organization of the Thesis

This thesis mainly includes seven chapters.

Chapter 1 introduces some key concepts used in this research, research purpose and significance, research questions and methodologies adopted in this research. Among these, the clarification and definition of the work-unit community is the foundation of this research because it is a concept unique to P.R. China.

Chapter 2 describes in detail the criteria and process of case selections in this research, including the selection of the case city- Nanjing, and the selection of the three work-unit community cases in Nanjing. And finally, three representative work-unit communities in Nanjing

¹²¹ Haken, H. *Information and Self-Organization: A Macroscopic Approach to Complex Systems*. Springer Series in Synergetics. Berlin, Heidelberg: Springer Berlin Heidelberg: Springer, 1988.

¹²² Wu, Tong. *Research on Self-Organizing Methodology (in Chinese)*. Series of Tsinghua Science and Technology. Beijing: Tsinghua University Press, 2001.

are selected in consideration of their geographic locations and the type of the work-unit that they belonged to.

In Chapter 3, the background of the evolution of work-unit communities at the national level is first illustrated, including the political background and housing-related policies and the development of typical housing and community types in the country. Then the analytical framework adopted in the following field investigations and analyses of case work-unit communities is explained, which mainly includes the administrative evolution and the morphological evolution of the case work-unit communities.

Chapter 4 gives detailed explanations of the evolution of the three work-unit community cases during the past decades in accordance with the analytical framework described in Chapter 3. To specify, the analysis of the administrative evolution is carried out based on their respective key turning points during the evolution in past few decades. The morphology evolution contains the social morphology and spatial morphology. For the social morphological evolution, the population composition changes and property right changes are selected as two key elements. For the spatial morphology evolution, the analysis will be carried out at three levels- the building level, the community level and the city level, each of which consists of various elements.

Chapter 5 analyzes the self-organization theory in detail, which is not an independent theory, but a group of different theories, including the "Dissipative Structure Theory", the "Synergetic", the "Catastrophe Theory", the "Hypercycle Theory", and the "Fractal Theory" and the "Chaotic Theory". Each theory is actually a methodology, however, as a whole, there should be a unified self-organizing methodology that links them together. Also, when explaining these theories, simple substitute explanations for the work-unit communities are included, which

preliminarily proved that the work-unit community system conforms to the prerequisites, evolution process and expression methods of self-organizing evolution.

Chapter 6 discusses the self-organizing administrative and morphological evolution of work-unit communities, and the corresponding retrofitting strategies based on the self-organization theory. Based on the analysis of the three work-unit community cases in Chapter 4, the analysis is also carried out from the administrative and morphological aspects.

Chapter 7 is the conclusions and discussions of the research. In this chapter, the final conclusions and expected contributions of the research are drawn. Also, the problems and prospects of the research are listed at the end, hoping to lay the foundation for the future research.

Chapter 2. Selections of Case Work-unit Communities in Nanjing

2.1 Selection of the Case City-Nanjing, P.R. China

Nanjing, the capital of Jiangsu Province of P.R. China, is the case city in this study, which is known simply as Ning and was once called Jinling or Jiankang in ancient China. The city has 11 districts, 94 sub-district offices or street offices (*jiedaobanshichu*) and 6 towns, with a total area of 6,587 km². In 2017, the built-up area is 1398.69 km², with the permanent population of about 8.34 million, and the urban population of about 6.85 million, and the urbanization rate is 82.3%.

The city is chosen for certain reasons. First, it is a "normal" Chinese city. When described as "normal", it means that it is neither as developed as top cities, such as Beijing, Shanghai, nor as backward as the western cities, such as Kunming, Guiyang. It is a typical tier II Chinese city, 1 as good as lots of other Chinese cities, which makes it a representative one.

Second, Nanjing is a distinctive city: (a) It has an important economic strategic position.

Located in Eastern China, Nanjing is in the middle part of the lower reaches of the Yangtze

River. It is an important "gateway city" to drive the development of the central and western

regions in P.R. China, and it is also an important nodal city where the eastern coastal economic

belt meets the Yantze River Economic Belt strategy;² (b) With a history of more than 2,000 years

of city construction, it has a special status and value in Chinese history. Known as the ancient

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¹ Although nominally Nanjing is called a new tier I Chinese city now, it is actually still a tier II city.

² The Yangtze River Economic Belt is a major national strategic development region in China, spanning the three major regions of East, West and Central China. Relying on the Yangtze river waterway, it promotes economic gradient development from the coast upstream along the river. It takes Shanghai-Yunnan Expressway and Shanghai-Chengdu Expressway, the two major transportation channels, as the development bases. Also, it gives full play to the central city radiation role of the Yangtze River Delta urban agglomeration, the urban agglomeration in the middle reach of Yangtze river, and the Chengdu-Chongqing urban agglomeration. In the meanwhile, it can enable those prefecture-level cities outside these three urban agglomerations to play their supporting roles.

capital of six dynasties, Nanjing was constructed as a capital for nearly 500 years and there are many historic buildings in the city. Nanjing's history has spanned four important development periods of China: the feudal period, the Republic of China period, the planned economy period of P.R. China and the socialist market economy period of P.R. China, each of which has left relatively obvious morphological traces in the city. Thus, there are numbers of work-unit community cases in the city that can be chosen from in this research; (c) It has a distinctive climate condition. Nanjing belongs to the northern subtropical humid climate district, with four distinct seasons and abundant rain. Spring and autumn are short while winter and summer are long. The temperature difference between winter and summer is remarkable. It was once one of the "four furnaces" of the country because of its high temperature in summer. However, due to the changes of the atmospheric circulation and the continuous afforestation in the city in the past few years, the heat degree of Nanjing in summer is greatly reduced when compared with other Chinese cities, the name of "furnace" has been removed today. Overall, Nanjing is a city with a mild climate, with very few extreme weathers.

Third, it was an important industrial city during the work-unit era of the country from the 1950s to the 1980s. In June 1954, the first National Conference on Urban Construction was held. In the conference, except for the capital- Beijing due to its special importance, other cities in the country were divided into four categories, and different construction guidelines were established for different categories. The first category included cities with a large number of key industrial construction projects, and there was an urgent need for the urban construction that would support these industrial enterprises, such as Taiyuan, Xi'an and Lanzhou. The second category was the expansion cities, whose construction policy was to make full use of the old urban areas and construct new ones in a planned way. The third category included cities that could be expanded

partially, and the fourth category refers to the general small and medium-sized cities. Nanjing was defined as the third one, and the guideline states that, "The third type of city is a city that can be partially expanded, which includes Nanjing, Jinan, Hangzhou, etc. New factories have been built in these cities, but not many. With the development of national industrial construction, the reconstruction or expansion of local factories can be carried out partially in these cities. Urban facilities should be maintained, and urban management can be strengthened". It can be judged here that a certain number of work-units had been built in Nanjing during that time.^{3, 4}

Last but not least, in China, for the work-unit community, on the one hand, most of these communities were built during the 1950s to the 1980s, which was a long time ago. On the other hand, as the subsidiary area of the work-unit, the work-unit community has not received enough attention as the working quarter at the beginning. Thus, the archival about the work-unit community is relatively scarce, and it is difficult to obtain the relevant data. And this is also one of the reasons why there have been few studies on the development of the work-unit community. Fortunately, having lived in Nanjing for three years, the author has gotten her master's degree from Southeast University, Nanjing, and thus has a good connection with the school and the city, which makes it possible and easier to gain related data and materials from local agencies as well as residents.

2.2 Selection of Case Work-unit Communities in Nanjing

Then, specific work-unit community cases in Nanjing are chosen. In this research, to ensure the inclusiveness of the cases, the location of the work-unit community and the type of the work-

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³ Editorial Department of "China Contemporary" Book Series. 1990. *Urban Construction in Contemporary China (in Chinese)*. 1st ed. "China Contemporary" Book Series. Beijing, P.R. China: China Social Sciences Press: Xinhua Bookstore.

⁴ Li, 2016.

unit it belongs to are two primary criteria.

1) Criterion 1: the location of the work-unit community

With the help of Tang and Liu's researches, the construction years and locations of different communities that were built from 1949 to 2004 in Nanjing can be collected and analyzed.^{5, 6} Based on certain milestones after the foundation of P.R. China in 1949, including the 1978 economic reform, the housing reform in 1988, and the official end of public housing provision in 1998, percentages of communities built in these four time periods: 1949-1978, 1979-1988, 1989-1998, and 1999-2004, are calculated and compared. Then by labelling locations of these communities on the city map and comparing it with the expansion process of urban built-up area of Nanjing, a concentric spatial distribution mode could be recognized. Since most work-unit communities were constructed from the 1950s to the 1980s, and it can be judged from the maps that communities constructed during this time period are mostly located in inner suburb, it is reasonable to argue that most work-unit communities are occupying good locations in the city. To specify, they are within about 30 minutes' travel distance by bus or subway from Xinjiekou, which is regarded as the city center of Nanjing. Under such a premise, cases located in different orientation locations in the city are chosen. According to Tang, while there are 11 administrative districts in Nanjing, the city can be roughly divided into five districts from the perspective of its orientation: central city, east city, west city, south city and north city. And judging from spatial survey results, each of these five orientations space owns certain traits. This research thus will follow Tang's city division mode and try to choose cases located in the five different divisions. [Figure 2-1 and Figure 2-2]

⁵ Tang, 2007.

⁶ Liu, 2011.

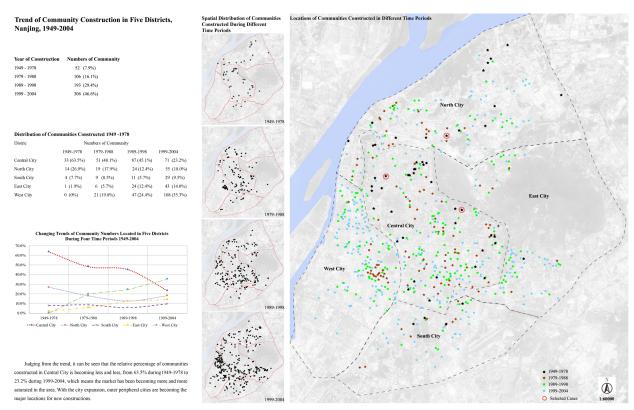


Figure 2-1 The trend and spatial distribution of communities constructed during different time periods in Nanjing, 1949-2004

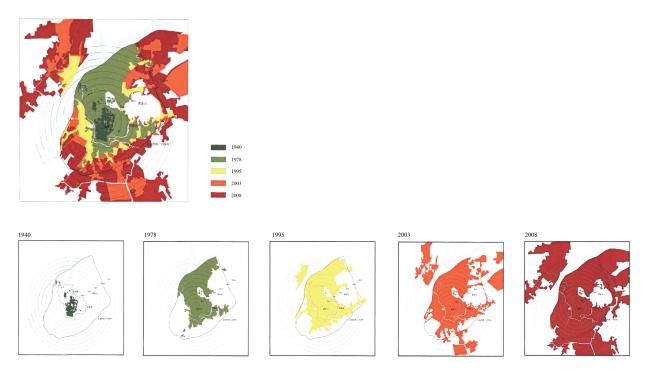


Figure 2-2 The expansion process of urban built-up area in Nanjing, 1940-2008 (source: from Liu, 2011)

According to locations of communities constructed in different time periods on the far right of Figure 2-1, the spatial distribution of communities constructed during the four time periods, namely, 1949-1978, 1979-1988, 1989-1998 and 1999-2000 can be extracted. And a concentric spatial distribution mode then could be recognized from the four images in the middle of the figure. In addition, as mentioned earlier, since most work-unit communities were constructed from the 1950s to the 1980s, it can be judged from the maps that communities constructed during this time period are mostly located in and around the Central City. In the meanwhile, the specific data on the left of Figure 2-1 shows that the relative percentage of communities constructed in Central City is becoming less and less, from 63.5% during 1949-1978 to 23.2% during 1999-2004, which means the market has been becoming more and more saturated in the area. With the city expansion, outer peripheral cities are becoming the major locations for new constructions.

Therefore, from the perspective of location, the selection range of case work-unit communities in this study is those located in the Central City or the inner suburb and constructed between the 1950s and the 1980s.

Last but not least, it can also be seen from the data that up to 2004, among all the main existing communities in Nanjing, the number of the work-unit community built before the 1980s accounted for about 24%, the number of communities constructed during the transitional period in the 1990s before the end of the national housing reform in the late 1990s was about 29.4%, and the number of communities constructed from 2000 to 2004 was about 46.6%. Thus, the work-unit community occupies a certain proportion in Nanjing, and the retrofitting of these work-unit communities is of certain value and significance.

2) Criterion 2: the type of the work-unit that the work-unit community belongs to

For the second criterion, during the work-unit era of P.R. China, there are mainly three types of work-unit based on their functions, namely the administrative work-unit, the enterprise work-unit and the institution work-unit. Administrative work-unit could be further subdivided into CPC (the Communist Party of China), government and military offices. Enterprise work-unit mainly include factories, warehousing and transportation work-units. Institution work-unit contains schools, hospitals, scientific research institutes, sports and cultural services. To ensure the comprehensiveness of the research, work-unit communities belonging to different types of work-unit would be chosen as cases in Nanjing. However, because of the political particularity of the administrative work-unit, cases would be selected mainly from the other two types, such as research institutions, schools, factories and hospitals.

Based on these two criteria, about ten alternative cases were chosen at the beginning.

Then field investigations were conducted on them one by one. And at last, three of them were selected because of their typicality. [Table 2-1]

It can be noticed that many characteristics of the three cases have been listed and compared in Table 2-1, including their locations in Nanjing, the work-unit type that it belongs to, their distance to the city center by the public transport, the full name of the work-unit community, the year of construction, the previous name of the work-unit that they belonged to, the current name of the work-unit, the current situation of the working quarter, the current situation of the living quarter, the original public service facilities, role players in the management of the community, the implementation of the handover of "Three Supplies and One management, illegal constructions in the community, the housing evolution, dimensions of the community, the number of housing units, housing price and maintenance fee of the community.

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⁷ Li, 2016.

Among these, the first row corresponds to the first criterion for the case selection in this chapter-the location of the work-unit community, and the third row is auxiliary. As can be seen from the table, Case 1 is located in the North City and can be arrived in 30 minutes from the city center by subway, Case 2 is located in the Central City and can be arrived in 20 minutes from the city center by subway, and Case 3 is also located in the Central City and can be arrived in 40 minutes from the city center by bus and subway. This information indicates that these three cases all have good urban geographical location, or as mentioned earlier, they are located in inner suburb.

The second row of the table corresponds to the second criterion for the case selection in this chapter- the type of the work-unit that the work-unit community belonged to. It can be seen from the table that Case 1 belonged to a central enterprise, Case 2 belonged to an Institution, and Case 3 belonged to a central enterprise, which, however, used to be an administrative agency. This exactly corresponds to the three work-unit types mentioned earlier.

All in all, these first three rows of information in Table 2-1 are the most relevant in this chapter. As for the other information listed in the table, here is just a brief introduction and comparison, many characteristics of the three cases will be further explained in Chapter 4.

Table 2-1 The three selected case work-unit communities in Nanjing

	Case 1: XNVC	Case 2: ISSC	Case 3: #1XC
Location in Nangjing (Criterion 1)	North City	Central City	Central City
Work-unit Type it Belongs to (Criterion 2)	Central Enterprise	Institution	Central Enterprise (Formerly Administrative)
Distance to City Center by the	30min	20min	40min
Public Transport Full Name of the Work-unit Community	by line 1 63 Heyan Road, Xianlu New Village Community, the Living Quarter of Nanjing Line Accessories Manufacturer	by line 4 + line 2 71 East Beijing Road Community, the Living Quarter of Nanjing Institute of Social Science, Chinese Academy of Sciences	by bus + line 1 #1 Xiaomenkou Community, the Living Quarter of No. 3503 Factory
Year of Construction	1956	1946	1954
Previous Name of the Work-	Nanjing Line Accessories Manufacturer	Institute of Physics and Mathematics, Academia Sinica (Republic Period)	No. 3503 Factory of the People's Liberation Army (Army Factory)
Current Name of the Work-unit	Nanjing Line Accessories Co., Ltd of China Energy Engineering Group	Institute of Soil Science, Chinese Academy of Sciences; Nanjing Institute of Geography & Limnology, Chinese Academy of Sciences	Nanjing Jihua 3503 Garments Co., Ltd
Current Situation of the Working Quarter	Moved in 2015, and the original site was sold to the developer and is in construction now (to be developed as high-rise commercial housing and commercial complex)	Still there, only institutions inside have been changed or added (to be moved in about 2 years)	Moved in 2010, and the original site, as well as other historical legacies of the factory is managed and developed by Nanjing Jihua Investment and Development Co., Ltd (N3503 ever after), which is a separated department from the company's production.
Current Situation of the Living Quarter	Well-maintained, and the <i>tuodi</i> or the basic guarantee work of the Residents'	The overall living atmosphere of the community is leisure and cozy: the quiet environment, giant trees, and the good location. However, there are a lot of wild grass, wasteland, construction waste (mainly caused by the addition of elevators), etc.	Fragmentation: the development of different plots has seriously invaded the original living quarter. The subject of responsibility is not clear, especially when it comes to N3503 or
	Committee is good.	caused by the dauntoin of circulators), etc. (up to July 2020) Also, there is no line drawings to divide the parking space and the parking is messy. (up to July 2020)	Residents' Committee. The <i>tuodi</i> or the basic guarantee work of the Residents' Committee is not very good.
Original Public Service Facilities	Rented out by the company since the housing reform and functions are converted	Only the kitchen, canteen and bathhouse (which might due to its good location), which were torn down and redeveloped as housing around 1996	Demolished and redeveloped
Role Players in the Management of the Community *the Maintenance of Open Space and Non-motor Vehicle Parking Sheds, Parking Management, Garbage Collection, Security Guards and Monitoring	Residents' Committee; Owners' Self- governing Management Committee; Street Office; Property Management Company; Volunteers; Residents, etc.	The Property Office of the Street Office; Residents' Committee; Property Management Company; Volunteers, etc.	3503 Logistics or Infrastructure Department (before the separation in 2010); Jihua Investment and Development Co., Ltd) (after 2010, and is mainly responsible for the development of the public domain); the Real Estate Development Co., Ltd; Stree Office; Residents' Committee; Property Management Company; Volunteers, etc.
The Implementation of the Landing of "Three Supply and One Management" "Three Supply" refers to the	"Three Supply" has been <i>luodi</i> or transferred to specialized enterprises or institutions;	"Three Supply" has been <i>luodi</i> or transferred to specialized enterprises or institutions; "One Management" has not;	"Three Supply" has been <i>luodi</i> or transferred to specialized enterprises or institutions; "One Management" has not;
water supply, power supply, and neating (gas) supply, and "One Management" refers to the property management within the work-unit community.	"One Management" has not; The management of retirees has not.	The management of retirees (Civil Servant) of the Institute still belong to the Institute.	The management of retirees has been <i>luodi</i> , except those retired veteran cadres who joined the factory before the foundation of P.R. China.
Ulegal Constructions	Mainly the illegal extensions at the First Floor of the Buildings (7 types)	Illegal extensions at the first floor of the building; Illegal extensions attached to the building; Illegal constructions used as storage space; Illegal buildings on the western border of the community; Illegal constructions in the area of the Republic of China Architecture	Illegal extensions at the first floor of the building; Illegal additions used as gathering space; Illegal additions used as storage space; Illegal additions used as functional rooms
Housing Evolution	Constructed from 1956 to 2001; Some old buildings have been reinforced and extended	Constructed from 1954 to 1996; Some old buildings have been reinforced and extended	Constructed from 1954 to 2001; No official reinforcement or extensions
Dimensions of the Community	300m * 250m	300m * 100m + 100m * 100m+ 200m * 50m	300m * 150m + 250m * 150m + 300m * 100m
Number of Housing Units referring to nj.lianjia.com)	702	915	1,576
Housing Price (CNY/m²) referring to <i>nj.lianjia.com</i>)	27,947	71,392	32,896
Maintenance Fee (CNY/m ² /month) (referring to <i>nj.lianjia.com</i>)	0.5	1.0	0.5

Chapter 3. The Evolution of Work-unit Communities in Nanjing

3.1 National Level Data

The focus of this research is at the Nanjing city level. However, before exploring that section, some background national level data need to be collected and analyzed first, which could be regarded as "non-specific interference from the outside" on the evolution of specific work-unit community cases in Nanjing.

3.1.1 The immaterial aspects- An interpretation of the political background and housing-related policy development in P.R. China

In the work-unit community, housing occupies the most critical position. Through the analysis of different research methods adopted by U.S. scholars on housing studies, the author hopes to find a more reasonable way to understand the evolution of work-unit communities in P.R. China.

In U.S., a capitalist country, housing issues have been a task of not only the government but also private developers, and in reality, the latter are actually playing a more significant role in the housing history. There are lots of researches about the housing development in U.S. In his book, Plunz traces New York's housing development from 1850 to 1990, exploring the housing of all classes, and discussing the development of different housing under different political, social, economic situations. Except for external physical forms of different housing types, such as the layout, height, density, site coverage, green rate, unit size and household appliances, the internal driving factors, including social forces, discipline development, economical situations and government legislations, are also analyzed in depth, which offers a brilliant methodology to understand not only "WHAT" but also "WHY and HOW" and would help better understand and

analyze the formation and future development of the work-unit community in P.R. China.¹ Also, Rowe has explored the housing development in U.S. from the viewpoint of modernism in architecture, and illustrated two specific moments in 20th century Western European and North American: 1920-1930, an emphasis on organization, specialization of function, division of labor, comprehensiveness of scale, rationalization and mass production and consumption, and 1970-1980, the representation of change and the concomitant possibilities of difference, and an interest in place, locale, and context, primarily a cultural continuity with the past, and individualized consumption and flexible production, which offers an innovative way to understand the relationships between modernity and housing in Western countries and motivates new perspectives, especially the technology view, of understanding and analyzing work-unit housing in P.R. China.² Bauer calls for government-funded housing in U.S. as a more agreeable alternative to the failures of the private market to provide a basic standard of living and believes that there was a lot to be gained by adopting many of communities' traits in Europe-Germany.³

All in all, it could be seen from these researches that the formation of different types of housing are the result of combined actions. The physical morphology is an external expression of complex political, social, economic, historical and cultural situations in certain periods.

In P.R. China, a socialist country, the governmental policies have been playing the most significant role in the housing development, especially the housing policy and the land policy. Despite of their different systems, the research methodology on housing studies is universal, which means the housing or the work-unit community in P.R. China is also a combined

¹ Plunz, Richard. *A History of Housing in New York City: Dwelling Type and Social Change in the American Metropolis*. Columbia History of Urban Life. New York: Columbia University Press, 1990.

² Rowe, Peter G. *Modernity and Housing*. Cambridge, Mass.: MIT Press, 1993.

³ Wurster, Catherine Bauer. *Modern Housing*. Boston, New York: Houghton Mifflin Company, 1934.

performance of different behind reasons. In fact, Lü et al. have analyzed the modern urban housing in P.R. China from 1840 to 2000 in their book, which deeply analyzed the behind political, economic, and social reasons of the formation of certain housing types, community layouts, etc.⁴ Thus, it is quite necessary to study the political backgrounds and policy changes of P.R. China in different time periods, which might act as the behind driving factors for the evolution of work-unit communities.

To begin with, there are certain political milestones between the foundation of P.R. China in 1949 and the stop of material distribution of the public housing in 1998. Here is a list of them: 1949, P.R. China was founded; 1958-1960, "The Great Leap Forward" and "The People's Commune Movement" were executed; 1961-1965, economic readjustment and rectification period; 1966-1977, "Cultural Revolution" period and the focus on inland construction due to war-preparation guidance; 1978, the Third Plenary Session of the Eleventh Communist Party of China (CPC) Central Committee was held and the "Reform and Opening-up Policy" was implemented; 1985, the Third Plenary Session of the Twelfth CPC Central Committee was held and a planned commodity economy system was pronounced; 1989, the Third Plenary Session of the Thirteenth CPC Central Committee was held; 1992, the Fourteenth National Congress of CPC was held, and a socialist market economy with Chinese characteristics was proclaimed.

Scholars have done lots of detailed researches on housing and land policy development of P.R. China. To name a few, Wang and Murie analyze the process of commercialization of urban housing in China and divide the process into different time periods based on the government

⁴ Lü, Junhua, Peter G. Rowe, and Jie Zhang. *Modern Urban Housing in China, 1840-2000*. Munich: New York: Prestel, 2001.

policies or actions.⁵ Before 1978, urban housing is predominantly owned by public sectors controlled by the central government, and most of the housing building, distribution, maintenance and management were decentralized to each work-unit. In 1979-1981, there were different experiments with the sale of new housing to urban residents at the construction cost. In 1982-1985, there existed different experiments with the subsidized sale of new housing. In 1986-1988, there also existed different experiments with comprehensive housing reform. Then the most significant change happened when the Implementation Plan for a Gradual Housing System Reform in Cities and Towns is issued in 1988, which unleashed the "beginnings of China's real estate market, culminating in the 'real estate craze' of 1992" and during which time large numbers of public rental housing was sold to employees in the work-unit at low prices and the number of the real estate development company increased rapidly. Instead of acting as a welfare provision provided by the central government, work-unit was becoming a revenue generating business in its own right.⁶ In 1991, On Comprehensive Reform of the Urban Housing System is issued. Although there have been no major changes in the overall objectives of housing reform compared with the 1988 version, this resolution proposed specific aims for several stages of the reform over a longer period and not the 3-5 years envisaged in 1988. However, the majority of the people are still living not only in the public-sector housing but in the housing bought by their public-sector employer. The concern about the low-price sale of the public housing led the suspend the process of housing reform at the end of 1993. Then in 1994, *The Decision on* Deepening the Urban Housing Reform is issued, in which the new strategies change three major

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⁵ Wang, Yaping, and Murie, Alan. "The Process of Commercialization of Urban Housing in China." *Urban Studies* 33, no. 6 (1996): 971–89.

⁶ Stokols, 2017.

aspects of the old housing system (*sangai*) and add four new elements to it (*sijian*).⁷ Then finally 1998 sees the stop of material distribution of public housing to urban employees and the introduce a cash subsidy of housing.^{8, 9} Wang also examines the development of public sector housing in urban areas between 1949 and 1988 through a study of Xi'an City.¹⁰

Some researchers are trying to figure out inner reasons of the slow transformation from the work-unit housing to the commodity housing. In his paper, Wu concludes that on the production side, work-units do withdraw themselves from the direct involvement in the housing construction since the economic reform begun. However, on the consumption side, the low incomes of state workers, due to the political economy, have forced the work-unit system to remain as an indispensable part of housing provision.¹¹

Land policy development is also affecting the housing market in P.R. China. In the book, Yeh introduces the dual land market that existed in Chinese cities, namely the coexistence of leased land and administratively allocated land and maintains that despite the introduction of land leasing after the land reform in 1988, a large proportion of land in China is still being

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⁷ Sangai: a new housing investment system with urban citizens paying a major part of their housing costs; transferring housing provision and management from the work-unit to specialized non-government bodies, various property development, thus improve the efficiency of industry and government services; material distribution to monetary distribution.

Sijian: to establish a dual housing provision system with a social housing supply (policy-oriented) to provide economic and comfortable housing to the middle and low-income households and a commercial housing supply for high-income families; to establish a public- and private-housing saving system; to establish housing insurance, finance and loan systems which enable both policy-oriented and commercial developments; and to establish a healthy, standardized and regulated market system of property exchange, repairs and managements.

⁸ Wang and Murie, 1996.

⁹ Wang and Murie, 2000.

¹⁰ Wang, Ya Ping. "Public Sector Housing in Urban China 1949–1988: The Case of Xian." *Housing Studies* 10, no. 1 (1995): 57–82.

¹¹ Wu, Fulong. "Changes in the Structure of Public Housing Provision in Urban China." *Urban Studies* 33, no. 9 (1996): 1601–27.

allocated through administrative methods. And a black land market was created due to the difference in land prices in the dual land market, which harms the land revenue of local government, leads to corruption, conflicts the overall urban planning and results into unregulated land use changes and urban sprawl. Also, contrary to popular notions, Lin claims that land commodification, rather than human capital or advanced technology, has played a role instrumental to the growth and transformation of P.R. China's metropolises. In their paper, Wu and Yeh analyze the concentric spatial distribution of different housing types under the influence of land reform. After the introduce of paid transfer of land-use rights (land lease) in 1987, redevelopment of the city center got high attention since the municipal government could make use of the high land value gap and developers could also gain high profits from the redevelopment to commercial and office land use in the city center. Also, the new development areas outside the old industrial areas were also popular, such as the Special Economic Zone. And the original land with high land development probabilities before the land reform got little attention, most of which are the work-unit area.

In a word, different political backgrounds, housing policies and land policies in transitional P.R. China have been affecting the transformation of housing types, standards, providers and buyers. They are also working together to formulate the concentric spatial distribution of different community types: inner urban core, middle work-unit area and outer commodity housing area.

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¹² Yeh, Anthony Gar-On. "Dual Land Market and Internal Spatial Structure of Chinese Cities." In *Restructuring the Chinese City: Changing Society, Economy and Space*, Ma, L.J.C. and Wu, F. (Ed.)., 59–79. London; New York: Routledge, 2005.

¹³ Lin, 2014.

¹⁴ Wu and Yeh, 1997.

At last, it is noteworthy that there now exist different housing tenures with varieties of housing types, qualities and locations. And urban residents have had multiple choices about housing. Through an analysis of their housing choices and underneath reasons, such as the income, household, job rank, *hukou*¹⁵, etc. of urban residents, it would make more sense to understand the more and more complicated population composition in the work-unit community, thus formulating more reasonable retrofitting strategies in this respect, which, from the perspective of local residents, would keep the current work-unit residents while attracting new ones.

Huang and Clark illustrate this kind of multiple housing choice in their research by maintaining a transfer from the only subsidized rental housing (also 'public housing', *gong fang*) in the socialist era to more choices regarding both housing type and tenure. On the one hand, sitting tenants of the public housing is given the option of either paying an increased rent or buying their current flats at subsidized prices. On the other hand, the newly built private housing by developers (namely, 'commodity housing' (*shang pin fang*)), and housing financed by households themselves mainly for owner occupancy (namely, 'self-built' housing (*zi jian fang* or *zi ji jian fang*) are becoming more and more popular housing options, especially for those who currently have no access to subsidized housing. ¹⁶ Also, they claim that housing tenure choice in urban China is affected by both the socioeconomic factors and the institutional factors characterizing the relationships among households, work units and the state: the stronger the relationship among these agents, indicated by higher work unit rank, higher job rank and job

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¹⁵ *Hukou* refers to a legal document prepared by the State administrative agency in charge of household registration to record and retain basic information about the household population. It is also the identity certificate of each of Chinese citizens.

¹⁶ Huang, Youqin, and Clark, William A. V. "Housing Tenure Choice in Transitional Urban China: A Multilevel Analysis." *Urban Studies* 39, no. 1 (2002): 7–32.

seniority as well as urban and permanent *hukou*, the more likely it is that households will access public rental housing and the less likely it is that they will shift to home-ownership.¹⁷ Also, Li and Huang examines various aspects of how individuals and households in Chinese cities have coped with the never-ending changes in the policy and built environment. The focus is on housing behavior, but neighborhood issues also feature prominently.¹⁸ And Li and Yi trace how individuals and households in Beijing responded to the different phases of the urban housing reform and gradually moved from renting work unit housing to owner occupation over the period 1980 to 2001.¹⁹

Along with the free choice and move of urban residents, certain spatial patterns have formed through the intra-city migration in Chinese city, in special, a housing segregation.

Different scholars have done relevant researches about this kind of living segregation. Li examines the evidences on the frequency of residential move and the related spatial patterns.²⁰ In her research, Huang claims that a relatively homogeneous society organized around work-unit compounds in socialist urban China is evolving into one with significant stratification and segregation and examines the dynamics of increasing housing inequality and emerging residential segregation in Chinese cities conceptually and empirically.²¹ According to Li and Wu,

¹⁷ Huang and Clark, 2002.

¹⁸ Li, Si-Ming, and Huang, Youqin. "Urban Housing in China: Market Transition, Housing Mobility and Neighbourhood Change." *Housing Studies* 21, no. 5 (2006): 613–23.

¹⁹ Li, Si-Ming, and Yi, Zheng. "The Road to Homeownership Under Market Transition: Beijing, 1980-2001." *Urban Affairs Review* 42, no. 3 (2007): 342–68.

²⁰ Li, Si-Ming. "Residential Mobility and Urban Change in China: What Have We Learned so Far." In *Restructuring the Chinese City: Changing Society, Economy and Space*, Ma, L.J.C. and Wu, F. (Ed.)., 175–91. London; New York: Routledge, 2005.

²¹ Huang, Youqin. "Form Work-Unit Compounds to Gated Communities: Housing Inequality and Residential Segregation in Transitional Beijing." In *Restructuring the Chinese City: Changing Society, Economy and Space*, Ma, L.J.C. and Wu, F. (Ed.)., 192–221. London; New York: Routledge, 2005.

with ongoing housing reform and a massive increase in housing construction, residential spaces in urban China are changing from largely mixed work-unit compounds towards differentiated neighborhoods. It argues that residential differentiation is constituted by 'sorting' stratified residents, regrouped according to their socio-economic status, towards differentiated neighborhoods: in the central areas, neighborhoods are being transformed into gentrified upper residential quarters, with the remainder turning into deteriorating workers' villages; meanwhile, the suburbs are becoming increasingly heterogeneous. Increased residential inequalities are found among these neighborhoods.²² Other researches focus on special communities for particular groups, such as golden ghettos for the wealth, foreign gated communities for foreigners, and migrant enclaves for low-income people.^{23, 24, 25, 26}

In summary, based on these interpretations of political backgrounds and housing-related policies in P.R. China from 1949 to the 2000s, the immaterial non-specific interferences from the outside at the national level can be sorted and listed based on critical time points or periods described above. [Table 3-1]

3.1.2 The material aspects- An interpretation of the development of typical housing and community types in P.R. China

²² Li, Zhigang, and Wu, Fulong. "Socio-Spatial Differentiation and Residential Inequalities in Shanghai: A Case Study of Three Neighbourhoods." *Housing Studies* 21, no. 5 (September 1, 2006): 695–717.

²³ Wu, Fulong, and Webber, Klaire. "The Rise of 'Foreign Gated Communities' in Beijing: Between Economic Globalization and Local Institutions." *Cities* 21, no. 3 (2004): 203–13.

²⁴ Wu, 2005.

²⁵ Zhang, Li. "Migrant Enclaves and Impacts of Redevelopment Policy in Chinese Cities." In *Restructuring the Chinese City: Changing Society, Economy and Space*, Ma, L.J.C. and Wu, F. (Ed.)., 243–59. London; New York: Routledge, 2005.

²⁶ Giroir, Guillaume. "Yosemite Villas–Mirror of Emerging Capitalism? An American-Style Gated Community in Beijing." *China Perspectives*, no. 64 (2006): 13–22.

Apart from the immaterial political backgrounds and housing-related policies, the nonspecific interference from the outside at the national level also includes material ones. To specify, based on similar time divisions, typical housing and community types constructed in the country during the past few decades can be collected and listed, which is mainly achieved through the web search and the literature research. In fact, drawings and photos of typical housing and communities have been taken from Architectural Journal. As mentioned earlier, founded in 1954, Architectural Journal is the earliest and most authoritative academic journal on the architecture design and urban planning in P.R. China. By summarizing and organizing its literature, thoughts and related designs of architecture and urban planning in the whole period since the foundation of P.R. China can be summarized. ²⁷ According to needs of this study, relevant articles about community and housing in different eras can be screened and extracted, and then summarized and sorted based on the type-morphology methodology, so as to grasp the construction process and evolution of the community and housing at the national level in the country, which can act as the background of the case work-unit community analysis in Nanjing. [Table 3-1]

²⁷ Xiong, 2010.

Table 3-1 Non-specific interference from the outside at the national level (Continued)

-00							
1998 2000-		Socialist market economy with Chinese characteristics	The stop of material distribution of public flowsing to urboxing to urboxing to urban employees and to introduce a eash subsidy of housing of housing				
1994		cet economy with Cl	The Decision on Deepening on Deepening the Urban Housing Reform Three changes (sangai) and four new clements (sijian)				
1992	The Fourteenth National Congress of CPC	Socialist marl					
1991		omy based on	On Donnershee Reform of the Comm of the Urban Housing System Soeveral stages for the reform over a longer period, not the 3-5 years envisaged in 1988				
1989	The Third Plenary Session of the Thirdeaun of Thirdeaun CPC Cental Committee	commodity econo					
1988		The policy of building a planned commodity economy based on public ownership	Inplementation Plan for a Gradual Housing System Gradual Housing System Edgom in Cities and Cities and Overall implementation and introduction of ousing subsides, but the sale of use right only, not the right to sall ion market; A land use right the ransfered in transfered in the right of sall to all the right to sall a sand sacordance with the provisions of law				
1979-1987	1985 The Third Plenay Plenay Session of the Twelth CPC Central Committee		1979-1988 Experiments on housing reform 1988 Blue Paper on Techinical Proflectes Proflectes Proceeding unit standards, a breakthrough in improving living conditions Buildings A house should be designed as a completed unit without should be designed as a completed unit without sharing an entrance with others (apartment unit)				
8261	The Third Plenay Session of the Eleventh CPC Central Committee	Reform and Openning-up Policy	Experiments on housing reforments on housing reforments on housing reforments on the page on Technical Policies Explicit stipulations about dwelling unit standards; a breakthrough in improving living conditions 1987 Design Code for Residential And house should be designed a completed unit without a completed unit without dayment unit)				
1966-1977	Cultural Revolution War- preparation, inland construction	ared as non-	1966-1976 A complete a stagnation in urban housing development; Most housing investment wasing investment wasing investment wasing investment wasing that were ususality a valiable in the carty 1970s, in the earty 1970s, emergence of high-rise of phigh-rise of apartment buildings and density increase				
1958-1960 1961-1965	Economic readjustment and rectification	Planned Economic System: Welfare Housing System; Gity of production not consumption, and Housing was regared as non- productive buildings; Land was provided by governments free of charge;	ратилен				
1958-1960	The Great Leap Forward and The Commune Movement 1958 Regulations of the P.R. China on Household Registration	n; insumption, and vernments free o	Small-sized apartment				
1953-1957	The First Five-Year Plan	Planned Economic System; Welfare Housing System; City of production not consumption, and Housing productive buildings; Land was provided by governments free of charge;	1955 A pursuit for applicability, conomics, and aesthetic possible; Standard housing design				
1949-1952	1949 Foundation of P. R. China	Planned E Welfare F City of pr productiv Land was	"Rational design but irrational irrational irrational ause." Large-sized apartment				
Years	Immaterial Aspects Political Backgrounds		2. Housing-related Policies				

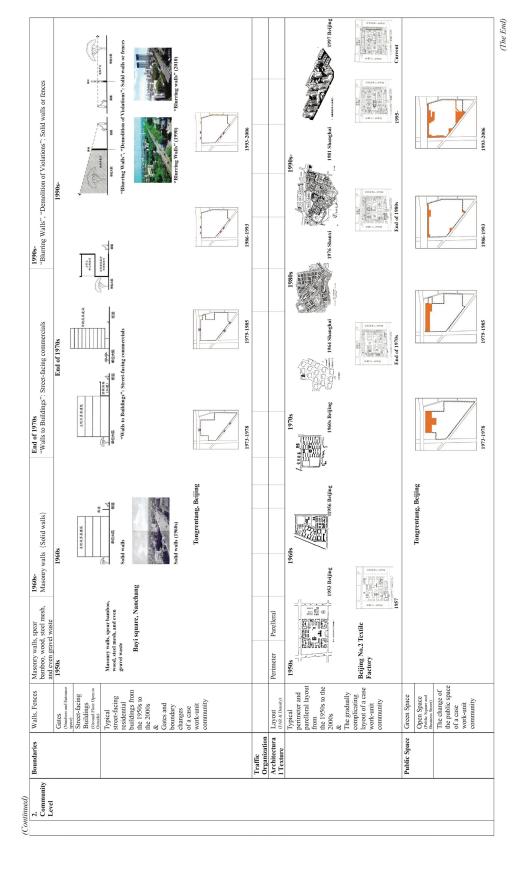
(Continued)

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Table 3-1 Non-specific interference from the outside at the national level (Continued)

2000-										
20	son				(1999)			2005		
1998	1998 9.3 m²/person			or or	Butterfy-daped high-ree boarding (1999)				1997	
1994				1990/8-	Butterfly-shap	SOHO housin		19904-	20000000000000000000000000000000000000	
1992					rive fundaming (1993)	complete unit (1988)	Diversity and International Style			
1991					Tower high-rise housing (1993)	Living-type lousing", complete unit (1988)		3	8861	
1989			om Fype	6 -	g			19808	P.	
1988	1988 6.3 m²/person		1980s Size of the hall:>= 6 m² Smaller bedroom and larger living room "Sleeping Type Housing" to "Living Type Housing"				1988s Borrowing from vernacular dwellings		-	
1979-1987	1983 1 5 m²/person	Middle 1980s Individual use: Bathroom 2-3 m ² Kitchen 4-6 m ²		. #1 (4) [31] .		Inner courtyard (1978)	Borrowing from		1977	
1978	1978 3.6 m²/person	1970s Improved a bit but no big changes	End of 1970s Popularity of the square hall and entrance hall	80.66		In		The first tipe-standard high-rice housing in Shangbai (1999)	1900	
1966-1977		1970 Impre big c						Step 1970s Stople and and formulaen (1955)	"gandalei"	
1949-1952 1953-1957 1958-1960 1961-1965 1966-1977	1955- 4 m²/person 4.5 m²/person 5 m²/person 6 m²/person		1960s- Small-sized square hall: Widen aisles (1.2m to 1.8-2m)	1960s	Small square ball (1962)	Point house(1969)			Sumpre and an 1959- Industrial system	1960s A bit lower, but mostly >2.8m
1958-1	- 4.5 m²/pe		1960s- Small-si Widen a				g	rm"; style elevati	1959- Industria	1960s A bit lov
1953-1957	4 m²/person 6 m²/person	Shared bathroom and kitchen				orridor 1055 1070	1935-1978 Thrifty; Anti-formalism	1949-1954 "Socialist Content, and National Form": A traditional "big roof"with Soviet-style elevations	Brick-wood and Brick- concrete	
1949-1952	1949-	Shared bathro	No "halls"		Outer corridor	Shorter inner corridor	Socialist Content, and National Form"; A traditional "big roof"with Soviet-style elevations; Formalism			>3m
	Bedroom: (Average Living Area Quota)	Kitchen & Bathroom	Hall	Typical floor plans of the residential building from the 1956s to the 2000s			raçade	Typical facade of the residential building from the 1950s to the 2000s	Structure	Floor Height
	Housing Units									
	1. Building Level									
		Material A								

Table 3-1 Non-specific interference from the outside at the national level (The End)



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As can be seen in Table 3-1, the list of typical housing and community types is carried out from two levels: the building level and the community level. The former mainly refers to the housing unit development, which takes the bedroom, hall, façade, structure and floor height as its main reference indicators. As described in the table, about the bedroom, the overall trend of the average living area quota is gradually increasing in the country- from about 4 square meters in the 1950s to the 9.3 square meters in 1998. The kitchen and bathroom were both shared at the beginning and later individually owned. In the middle 1980s, the average area of the individual bedroom is 2-3 square meters and the individual kitchen is 4-6 square meters. Then it is the change of the hall in the housing units. There was no hall at all in the 1950s, then small-sized square hall appeared in the 1960s, which is actually the widen aisle. In the 1980s, the size of the hall is no less than 6 square meters. The idea of "smaller bedroom and larger living room" began to become popular and there is a change from "sleeping type housing" to "living type housing". Typical floor plans of the residential building from the 1950s to the 2000s are then listed to show the changes of the bedroom, kitchen and bathroom and the hall intuitively. The façade of the residential building is another key indicator to show the housing development in the country. As shown in Table 3-1, in the early days of the foundation of P.R. China, the idea of "Socialist Content and National Form" was adopted and a traditional "big roof" with Soviet-style elevations was quite popular, which actually is formalism. Then ever since the middle of the 1950s, the idea of thrift and anti-formalism began to prevail. In the 1980s, the idea of borrowing from vernacular dwelling to design the façade of the residential building is adopted. Ever since the 1990s, the façade of the residential building began to diversify and internationalized. Drawings and photos of typical façade from the 1950s to the 1990s are also listed. At last, the residential building is mainly brick-wood and brick-concrete structure in the 1950s. Then ever

since 1959, an industrial system has been adopted. And when the state of the national economy was at its lowest ebb in the 1960s, "gandalei" was quite popular, which is a simple method of building a wall by tamping clay between two stationary planks. In the meanwhile, as mentioned above, a formalism was popular in the early days of the founding of P.R. China, thus the floor height was greater than 3 square meters at that time. Then in the 1960s, similar to the structure, the average height of the residential building was a bit lower, but mostly greater than 2.8 square meter.

At the community level, there are also several indicators, including the changes of boundaries, building functions, traffic organization, architectural texture, and the public space. As to boundaries of the work-unit community, in the 1950s, the community was mainly enclosed by masonry walls, spear bamboo, wood, steel mesh, and even gravel waste. Then in the 1960s, masonry walls or solid walls became the mainstream. Since the end of 1970s, lots of original enclosure walls of work-unit communities have been transferred to street-facing commercial buildings under the impact of the socialist market system. Then, after the 1990s, under the policy guidance of "Demolition of Violations", most of these illegal buildings were torn down and walls were back again. However, walls constructed after the 1990s are mostly "blurring walls", such as fences, which have enhanced the interaction between the inside and the outside. Typical street-facing residential buildings from the 1950s to the 2000s and gates and boundary changes of a case work-unit community are listed in the table. Typical perimeter and parallel layout from the 1950s to the 2000s in the country and a gradually complicating layout of a case work-unit community are shown in the table too. At last, the change of the public space of a case work-unit community is listed in the table.

All in all, the analysis of typical housing and community development at the national level can help us better understand the evolution of the work-unit community in Nanjing. In fact, the following analysis of the case work-unit communities in Nanjing, both at the building level and at the community level, is also carried out based on the same framework and the same indicators are adopted. Last but not least, as described earlier, the formation of different types of housing and community are the result of combined actions and the physical morphology is an external expression of complex political, social, economic, historical and cultural situations in certain periods. Thus, the interpretation of the political background and housing-related policy development in China in Section 3.1.1 is of great significance in this research. As a matter of fact, it is not only the basis for the definition of "separation" in Section 1.2, but also the basis for the division of communities constructed in different time periods in Nanjing when selecting case work-unit communities in Section 2.2.

3.2 Nanjing City Level Data

This section will explain the analysis mode of specific case work-unit communities in Nanjing, which can act as the basic framework of the field investigation and the case analysis in Chapter 4. As mentioned in Section 1.2, in this research, when it comes to specific work-unit community cases in Nanjing, the evolution trajectory analysis consists of two aspects, namely, the administrative evolution and the morphological evolution. In fact, this is also consistent with the analysis at the national level, one is invisible and the other is visible.

3.2.1 Administrative evolution

For the administrative changes, the verbally conducted questionnaires for different community-related role players, such as the street office, the residents' committee, the homeowners' committee, the property management company, private developers, volunteers as

well as residents, are the main data resources to comprehensively understand the daily management of the community over time, including the parking management, garbage collection, security and monitoring, greening and open space maintenance.

As explained in Section 1.2, the separation of the working quarter and the living quarter is the key turning point for the work-unit community's administrative evolution. To specify, before the separation, the Logistic department of the work-unit is the main actor involved in the management of the community. During those periods, the daily management of the community and major building constructions or extensions and reinforcement are all led by the department and supplemented by residents or volunteers, which is generally a stable and simple process. In the meanwhile, residents also might have certain autonomous constructions, among which the first-level extended yards or rooms is the most common one.

Then comes the separation, which starts mostly after the end of the housing reform in the late 1990s and has led to the complexity and diversity of the work-unit community's evolution. As mentioned in Section 1.2, despite of the fact that the housing reform officially ended in 1998, the change of the work-unit community does not reach its climax until the later turning points in different work-unit communities. For instance, in Case 1, the chaos is the most serious and obvious when the working quarter moved away geographically in 2015. Case 2 and Case 3 also have their own unique turning points after the official end of the national housing reform.

In this thesis, thus, the analysis of the administrative evolution of these three cases will be based on these turning points, and the administrative organization chart in different time periods will be summarized and compared, so as to grasp the trajectory of their administrative evolution.

3.2.2 Morphological evolution

Morphology contains the immaterial social morphology and the material spatial morphology. In this study, for the social morphological evolution, the population composition changes and property right changes are selected as two key elements. For the spatial morphology evolution, the analysis will be carried out at three levels- the building level, the community level and the city level, each of which consists of various elements.

3.2.2.1 Social morphological evolution

On the whole, the social morphology tends to evolve from single to complex, which starts from the housing reform. To specify, as to the population compositions, there is a change from the employees and their families only to a mixture of retirees, outside homebuyers and tenants within the community. However, it is found that retired employees from the original work-unit account for a larger proportion within current work-unit communities.

For the property right analysis, in the living quarter, the majority of the housing has been sold to the original employees of the work-unit during the housing reform period, which has since then been circulated as other newly-built commercial housing in the market. Only a few of them still belong to the factory and are being rented out. On the other hand, the original public service facilities, as well as the original working quarter site, are dealt with in different ways, despite of the state's promotion of the socialized management of public service facilities in work-unit communities.

3.2.2.2 Spatial morphological evolution

For the spatial morphological evolution, which will be analyzed at three levels- the building level, the community level and the city level, the archive is the key data resource and questionnaires for residents and administrative staffs are also available for reference.

Luckily, despite of the fact that the working quarter has been separated from the living quarter in most work-unit communities, and the original infrastructure department has been revoked or reorganized, the archive department still exists for the three work-unit community cases, which owns needed drawings of the community, such as site plans in different years and all the buildings' drawings, as well as some later extensions and reinforcements. However, it must be clarified that the completeness of the archive of the three cases varies, and some are even not available because of confidentiality. By virtue of those available ones, the researcher then can redraw site plans of the community and different housing unit types over time.

a. Building Level

At the building level, both the residential and public service buildings are the research objects. By virtue of pictures taken from the archive, which include drawings of almost all the buildings within the community ever since its appearance, such as the floor plans, elevations and sections, typical housing units constructed in different years will be redrawn and listed under the guidance of the typo-morphological approach, which hopefully echoes to the national level standard housing policies. Also, extensions, reconstructions and functional changes of public service facilities will be redrawn too, such as the auditorium, kitchen and canteen, bathhouse, hostel and workers' children school. In this research, two kinds of changes that have happened in the evolution of these public building are observed and deemed to be typical. One is the intermittently extensions and reconstructions, which mostly happened before the separation, and the other one is the changes of their functions, which mostly happened after the separation. In this research, the analysis of public service buildings will be carried out from these two aspects.

b. Community Level

The analysis at the community level in this study focuses on the changes of four key elements, namely, boundaries (including the enclosure form, the number of gates and the entrance space, and the street-facing buildings), the traffic organization, the architectural texture, and the public space (including the green space and the open space, such as the public square and the business street).

By virtue of photos of drawings taken from the archive, the research can redraw site plans of the community in different years. It should be noted that depending on the completeness of the data, the number of site plans in different community cases might vary and the years chosen might be different.

Then by superimposing and contrasting these site plans of different years, the spatial morphology changes that have happened at the community level could be judged. Hopefully, the boundary lines, locations of gates and functions of street-facing buildings can be judged from the redrawn site plans, supplemented by buildings' floor plans. The traffic organization and the architectural texture changes can be seen intuitively from the site plans too. And it is expected that the interior spatial layout of the work-unit community was becoming more and more crowded and miscellaneous with the addition of new buildings, extensions on existed buildings as well as functional changes of some public service facilities. As the architectural layout changes, the road network would be changed or adjusted as well.

As to the last element- public space, because the drawings obtained are mostly building-related, the depiction of the public space is relatively vague and missing. Therefore, with the help of questionnaires, this study will make reverse speculations based on the current situation of the public space in the community, with an aim to obtain as much information about the evolution of the public space as possible. Also, the current situation of these public space can reflect the pros

and cons of the administrative management of the work-unit community as other public infrastructures.

c. City Level

The analysis of the community at its building and community levels are more focusing on its inner self-organizing evolution. In the meanwhile, the community's spatial morphological evolution is also affected by the city-level spatial morphological changes, such as the development of surrounding plots, road networks and the public space. However, it should be clarified that, just as the non-specific interference from the outside at the national level described in Section 3.1, physical changes that have happened around the community are also acting as "non-specific interferences" from the outside. And it is expected that all these city-level developments, especially the developed public transportations and the surrounding public space, would attract residents in the community out into the city, and thus promoting the openness of the community and its integration into the city.

Based on field investigations, it is found that for community residents, in which the elders occupy a larger proportion, the most popular trip modes include walking, riding the electric bicycle and by bus or subway. Thus, the physical scope of this research is defined as the area that can be reached within a certain period of time based on the different modes of transportation, such as 10 minutes and 15 minutes by walking. The needed data can be collected through Baidu map and Amap.

Then different elements are chosen as analysis carriers under the three categories, namely, surrounding plots, surrounding road networks, and the surrounding public space. The surrounding plots can be described as the land use types, such as residential, commercial, green space. The road networks mainly refer to the road network, subway lines and bus lines. The

public space consists of public service facilities and the open space, with the former includes commercial, medical, educational, sports and cultural facilities, vegetable markets, and the latter includes public squares, parks, water bodies, green space and business streets.

Chapter 4. Case Analysis

4.1 Case 1: 63 Heyan Road, Xianlu New Village Community (XNVC)

Constructed in 1956, Xianlu New Village Community was the living quarter of Nanjing Line Accessories Manufacturer (NLAM), which could be categorized as an enterprise work-unit, one of the three types of work-unit based on their functions. According to an authoritative website for selling houses in the country, in XNVC, there are about 702 housing units, the housing price is 27,947 CNY/m² and the maintenance fee is about 0.5 CNY/m²/month.¹

NLAM was established on April 26, 1952 to produce electric power fittings for the country. It was originally under the direct control of the Ministry of Water Resources and Power of China. On January 1, 1987, it was placed under the leadership of Jiangsu Electric Power Bureau (Company). On September 29, 2011, NLAM was assigned to China Energy Engineering Group, a central enterprise that is under the direct leadership of the State-owned Assets Supervision and Administration Commission of the State Council (SASAC), and the factory was renamed as Nanjing Line Accessories Co., Ltd of China Energy Engineering Group. Currently, it has become the nation's largest research, design and manufacturing manufacturer of the electric power tools and construction equipment, making it a leading enterprise that provides supporting products for the construction of China's power transmission and transformation projects.

Judging from the evolution trajectory of the factory, it can be seen that the enterprise has always been a central enterprise that is directly under the control of the state. Before the official end of the national housing reform at the end of the 1990s and the geographical withdraw of the

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¹ "Nanjing Xianlu New Village Community _ Details of Xinalu New Village Community | Second-Hand Housing | Rental Housing | Community Consultant (Nanjing Lianjia)." Accessed November 25, 2019. https://nj.lianjia.com/xiaoqu/2511053862135/.

factory in 2015, the community or the living quarter of the factory, as well as the working quarter, is largely under the unified management of the factory. During that time, certain departments, such as the infrastructure department, the security department, welfare department, were responsible for the management of the community and the welfare of the employees living in it. In the meanwhile, some residents' spontaneous organizations were also involved in the management of the community to a certain degree. In chronological order, they are family committee, residents' committee of the factory, residents' committee of Guangming Village, residents' committee of XNVC.

Then with the official end of the housing reform at the end of the 1990s and the geographical relocation of the working quarter in 2015, the management mode of the community began to change, especially after the factory moved away geographically in 2015. Generally speaking, instead of the factory assuming the main responsibility, more and more role players started to get involved, such as the street office, the residents' committee, residents, and the property company. And the factory's strength of power is getting weaker and weaker while the residents' influences are growing.

Just as with most other similar enterprise work-unit communities, XNVC fell into a chaos as the housing reform progresses and the gradual withdrawal of the factory, especially when the working quarter physically moved away in 2015. However, it finally succeeded in stabilizing within a short time with the cooperation of different role players, including the street office, the residents' committee, the homeowners' self-governing management committee, the property management company, and volunteers among residents. This successful transition from chaos to stability raises the question of what kind of management mechanism made it possible.

In terms of the location of the factory, its living quarter has been adjacent to the working quarter from the very beginning, both of which are located in the north city of Nanjing. Then in 2015, the working quarter moved away to a new site in Liuhe District of Nanjing, which is far away from the original living quarter and it would take nearly an hour and a half to get there by taking the public transportation. The new site was bought by the local government through the bank loan and the original site of the working quarter was sold to a developer by the government and certain dividends were given to the factory. Naturally, the living quarter was left in place, which is about 30 minutes from the city center (Xinjiekou) by subway and makes it a relatively well-located community.

The spatial layout of the surviving XNVC is quite compact and well-organized, the residential and public buildings are clearly divided, the road framework is plain, and the large or small squares embellished among them. In fact, one would be highly impressed by its well-maintained environment and the strong sense of life as soon as you get there. You will first notice the brand-new posters on the walls of the entrance corridor that are introducing the evolution and characteristics of the factory, including the community itself, which will help you quickly understand the basic history and culture of the community, and also reflects the seriousness and responsibility of the management staff. After passing through the corridor, on your right front, a well-designed small garden and a single-story building with white walls and gray tiles will immediately draw your attention, both of which are very new and attractive. Upon entering the building, you will find that the building is surprisingly a non-motor vehicle parking shed. Before 2017, this small garden was occupied by parking and with no attraction at all. After a public opinion survey that lasted from the second half of 2018 to May 2019, a "Microrenovation" was carried out. The garden and the one-story parking shed were both renovated and

beautified, which is financially supported by the government and is one of the greatest physical changes that have happened within the community after the moving away of the factory.

Back to the main road facing the entrance corridor, on the left side, there are small businesses with separated doors such as restaurants, groceries, etc., and by looking forward, at the end of the road is a large, lively and prominent public square, which later turns out to be the central square of the whole community and is quite well maintained. By walking along the main road of the community and exploring branch roads from time to time, you will notice some other large or small public squares, some spontaneous gathering places, the small courtyard built by residents themselves in front of their house, and the well-maintained greening and the scattered but ordered parking. Most important of all, despite of the fact that buildings in the community were constructed intermittently from 1956 to 2000, along with occasional extensions and reinforcements, overall, they look very clear and neat, including those illegal first-floor extensions in front of each building. Last but not least, residents of the community, especially the elders, are very enthusiastic. And while you are talking with them, you can feel their strong sense of pride and belongings to their community.

Specifically, existing buildings within the community were built at different times from the 1950s to the late 1990s. There are totally about twenty-nine residential buildings and public facilities within the community have always been fully equipped when compared with other case work-unit communities, including the auditorium, kitchen and canteen, bathhouse, hostel, workers' children school. Today, these public buildings have been preserved but most of them have undergone functional transformation, such as being used as the hotel, school and offices. Naturally, service targets of these buildings are no longer limited to factory employees and their families, but are more and more socialized, attracting people from surrounding urban areas.

There are five residential buildings within the community that were constructed in 1956, the three-story building No. 2, building No. 3, building No. 4, building No. 6, and building No. 7, making them the oldest ones. However, they have all experienced expansions and reinforcements during past years. Thus, their appearance looks relatively neat and uniform, but the internal structure and other details are a bit unsatisfactory. The four-story east building No. 5 was built in 1964. The three-story building No. 28, building No. 29, building No. 30 and west building No. 5 were constructed around 1973. building No. 26 and building No. 27 were constructed as five-story residential buildings in 1976. Then during 1979 to 1983, the six-story building No. 8, building No. 18, building No. 17, building No. 24, building No. 25, building No. 19, building No. 20 and building No. 23 were built one after another. The five-story mixed residential and commercial building No. 21 and building No. 22 were also constructed in 1983. The six-story bridge building No. 32 at the entrance of the community was constructed in 1989 and is also a mixed residential and commercial building. The last batch of newly built residential buildings in the community included the six-story building No. 16, building No. 15, building No. 14, building No. 13, building No. 12 and building No. 11, all of which were constructed during 1990 to 2000, roughly coincides with the time set by the state for the housing reform to end.

Although these residential buildings were constructed in different years, the layout is quite compact. They are organized in rows on the north side as a group and on the southeast side, they are also in a group. They are generally isolated from the commercial streets and public buildings at the entrance. The residential area is quiet, and the commercial area is lively. The two area does not disturb each other, but interdependent, showing a cohesive and vitality community.

In summary, XNVC is chosen as a case in this research for its well-maintained environment and the strong sense of life with the cooperation of multiple role players, despite of

the drastic changes in housing policies, the geographical removal and administrative withdrawal of the working quarter, especially when compared with other work-unit communities with similar backgrounds. And this would undoubtedly attract one to explore the management mode behind it.



Figure 4-1 The entrance corridor, small garden and the one-story parking shed in XNVC



Figure 4-2 Squares, the small courtyard built by the residents in front of their house, and the well-maintained greening, scattered but ordered parking in XNVC

4.1.1 Analysis process

In this research, the analysis of XNVC will follow the framework described in Section 3.2, which consists of the administrative evolution and the morphological evolution. Data collection heavily relies on questionnaires and archives.

4.1.1.1 Administrative evolution

Before exploring the evolution of the management mode of the work-unit during the past few decades, it is quite necessary to clarify the management mode at the macro level of the entire country because the former can be said to be a microcosm of the latter. In P.R. China, there are two main lines when it comes to the management of the country: Party committees at all levels under the leadership of CPC (the Communist Party of China) Central Committee, and governments at various levels under the leadership of the State Council, and the latter is somewhat obedient to the former at the same level. For instance, the municipal government is obedient to the municipal Party committee. Also, the basic Party organization structure of CPC is shown. It should be clarified that the Party branch is the most basic organization of the Party organization and the Party group is a part of the Party branch and an organization form of managing the Party members under the leadership of the Party branch. [Figure 4-3]

The Party and Government Structure of Chinese Government

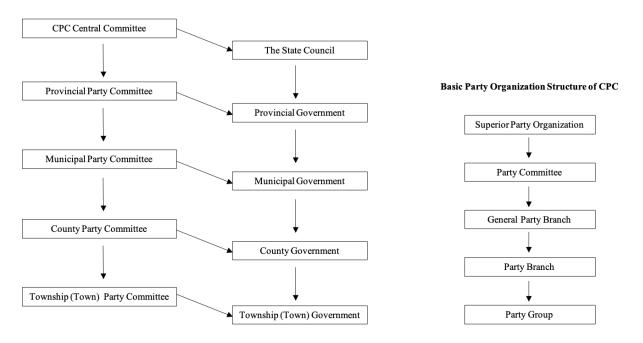


Figure 4-3 The Party and government structure of Chinese government & Basic Party organization structure of CPC

As a result, it can be expected that in a work-unit, NLAM in this case, the Party organization has been playing an important role in the management of the factory. As a matter of fact, both the living quarter and the working quarter have been under the leadership of the same Party organization until the establishment of the committee of the general Party branch in the work-unit community itself in 2010, which also echoes the gradual withdrawal of the factory during that period. [Figure 4-4]

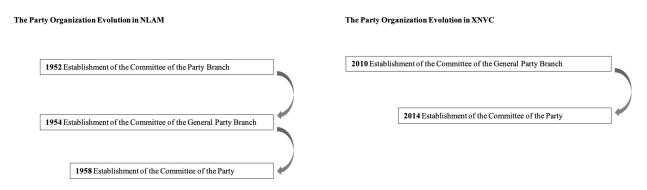


Figure 4-4 The Party organization evolution in NLAM and XNVC

Then when it comes to specific administrative evolution trajectory of the community, it is lucky that an officially published factory record in 2012 can provide detailed data for the case analysis. Actually, before the housing reform and the geographical withdraw of the factory, together with the working quarter, the community is largely under the unified management of the factory. And the management system in the factory has gone through four main stages under the leadership of the Party committee based on the *Factory Records of Nanjing Line Accessories Manufacturer* (2012) (Hereinafter referred to as Factory Record). However, it should be notified that in the living quarter, along with the official departments of the factory, some residents' spontaneous organizations are also involved in the management of the community, whose influences are actually getting stronger and stronger, corresponding to the gradual withdrawal of the factory.

In summary, based on the Factory Record and other relevant data, the following general organization charts of four phases can be drawn, along with detailed organization charts of typical years within each phase. [Figure 4-5 to Figure 4-14] In these charts, red fonts refer to the department or personnel involved in the community management and the white text on a gray background refers to the job it does. To ensure the accuracy of the data as much as possible, it should be pointed out that since the Factory Record was published in 2012, the organization charts of the factory before 2012 are all redrawn by the author based on the Factory Record and the one in 2019 is heavily based on the author's field investigation, which can best reflect the community's current management mode. [Figure 4-14] During the field investigation, verbally conducted questionnaires for different community-related role players, such as the street office, the residents' committee, the homeowners' self-governing management committee, the property management company, developers, volunteers as well as residents, are the main data resources to comprehensively understand the daily management of the community over time, including the parking management, cleaning and garbage recycling, security and monitoring, greening and open space maintenance.

Phase I (1956-1960): The division of labor responsibility system under the collective leadership of the Party committee. [Figure 4-5, Figure 4-6]

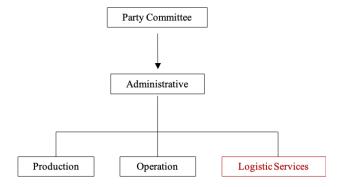


Figure 4-5 General organization chart of Phase I

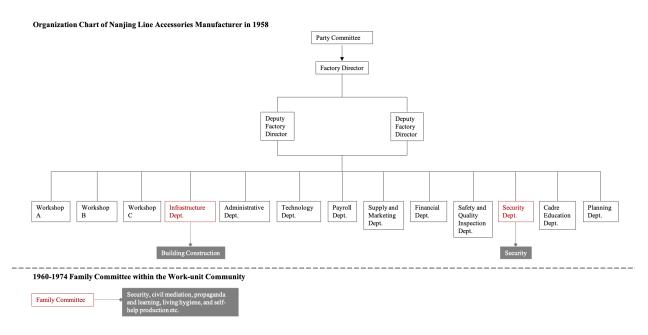


Figure 4-6 The organization chart of NLAM in 1958 and the family committee within the work-unit community in 1960-1974

Phase II (1961-1966): The system of the factory director designated to undertake responsibility under the leadership of the Party committee. [Figure 4-7, Figure 4-8]

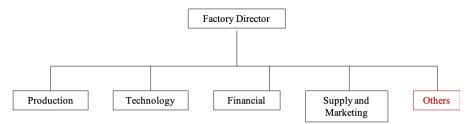


Figure 4-7 General organization chart of Phase II

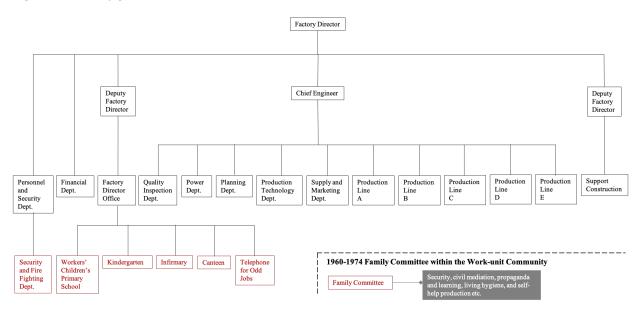


Figure 4-8 The organization chart of NLAM in 1965 and the family committee within the work-unit community in 1960-1974

Phase III (1967-1978, the Cultural Revolution): Revolutionary committee leadership system. [Figure 4-9]

General organization chart of Phase III

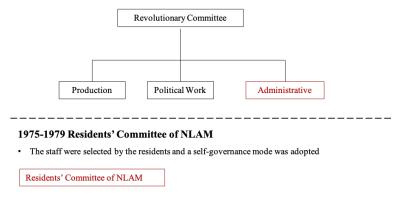


Figure 4-9 General organization chart of Phase III and the residents' committee of NLAM in 1975-1979

Phase IV (1985-): The system under which the factory director assumes full responsibility. It should be notified that in 1978-1984, the system is the same as phase II and a branch system is adopted from 1987-1988. [Figure 4-10 to Figure 4-14]

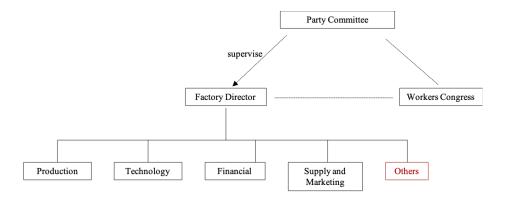


Figure 4-10 General organization chart of Phase IV

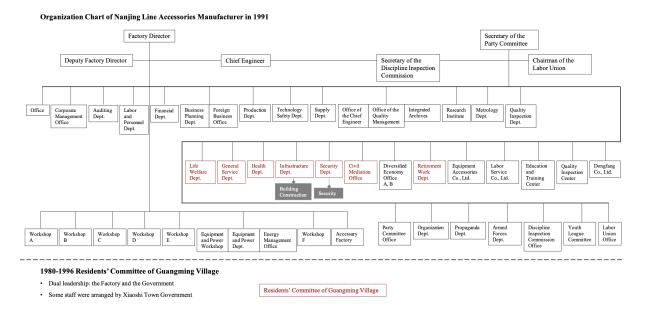


Figure 4-11 The organization chart of NLAM in 1991 and the residents' committee of Guangming Village in 1980-1996

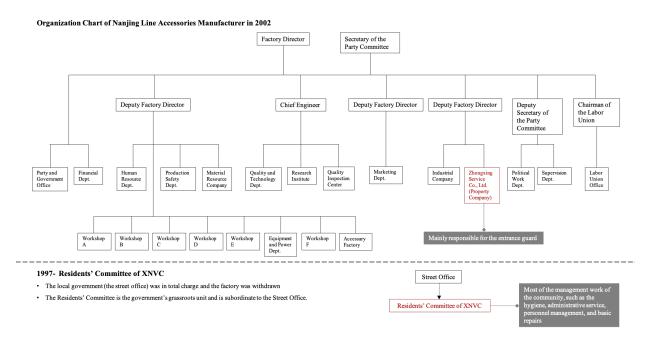


Figure 4-12 The organization chart of NLAM in 2002 and the residents' committee of XNVC from 1997

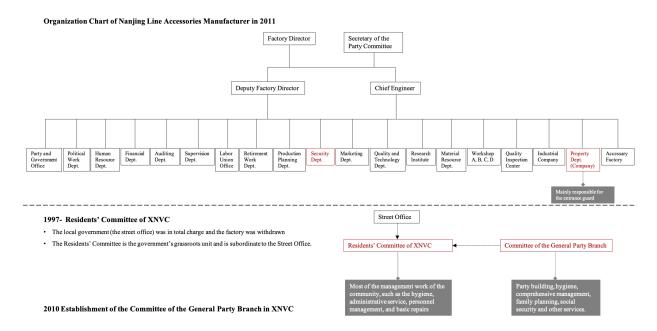
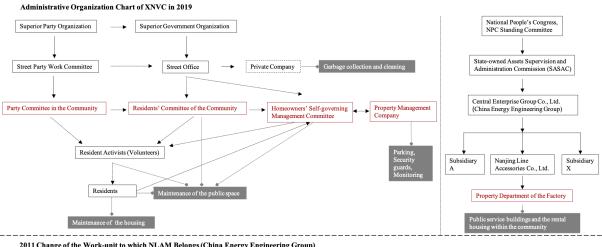


Figure 4-13 The organization chart of NLAM in 2011 and the residents' committee of XNVC from 1997 with the establishment of the committee of the general Party branch in XNVC in 2010



2011 Change of the Work-unit to which NLAM Belongs (China Energy Engineering Group)

2014 Establishment of the Party Committee of XNVC

2015 Establishment of the Homeowners' Self-governing Management Committee

Figure 4-14 The administrative organization chart of XNVC in 2019

These charts and other relevant data help prove that the official end of the national housing reform in 1998 and the geographical relocation of the working quarter in 2015 are two key turning points for the change of the administrative mode in XNVC. [Figure 4-15] And it is noteworthy that the residents' committee of XNVC was officially established in 1997, meaning that the community began to develop its own management model.

Here, there is a need to clarify the concept of residents' committee in the country. In fact, the concept of residents' committee in P.R. China is different from that in U. S. In P.R. China, the residents' committee is in principle an autonomous organization of residents, and the street office is the most basic level government agency. Residents' committee is set for the selfmanagement, self-education and self-service of residents. But in fact, due to various practical factors, especially its excessive administrative power, the residents committee in the country is more like an executive agency of the street office, and many people regard it as the most basic organization of the government. Thus, this study also considers it as part of the local

government. However, in reality, both of them do not exercise too much top-down executive power. Instead, they have always been playing roles of auxiliary.

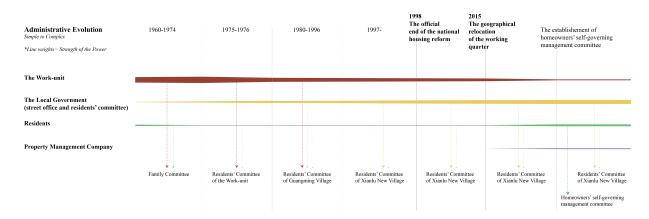


Figure 4-15 The administrative changes in XNVC through the 1950s to the 2010s

Generally speaking, before the two key turning points, different but specialized departments of the factory in different years, such as the logistic department, the security department, the infrastructure department, the welfare department, and the property department (company), are main actors that are involved in the management and constructions of the community.

Before further explaining the administrative evolution of XNVC, here is a brief explanation of a few typical departments. The logistic department's main job is to provide logistic support, which directly acts on other departments within the group and plays a vital role in their normal operation and plays an indirect role in achieving the group's goals and tasks. In short, the logistic department is to provide material services for the smooth realization of the functions of other departments. It can be said that the logistic department is a relatively broad concept. Except for the main production and operation activities of the enterprise, it would be involved in almost all aspects of the entire work-unit. Of course, the living quarter (XNVC) is included too. Infrastructure department is mainly responsible for the building construction of the factory, including the working quarter and the living quarter. Within XNVC, they are mainly

responsible for the construction as well as the later reinforcement and extensions of all the residential buildings and public service buildings. The responsibility of the security department is to keep the entire factory safe. Welfare department is mainly responsible for the welfare of employees, such as their medical insurance, reimbursement, and the management of retired employees.

In this research, the pros and cons of the administrative management of the community are mainly manifested through its physical performance. Thus, the management of the physical space within the community is the focus of the research, and the welfare of employees is not involved too much. Anyhow, no matter which department is specifically responsible for the management of the living quarter, it can be said that the work-unit/factory is playing the main role in the management of the community before the two key turning points, which is supplemented by residents or volunteers to certain extent. For the latter, in addition to various committees formed by residents, such as Family Committee in 1960-1974 and different Residents' Committee later, there are also certain prominent autonomous constructions by residents, such as the commonly seen first-level extended yards or rooms. In general, the evolution of XNVC was relatively a stable and simple process before the separation begun because the management party was rather fixed and simple.

Then the separation occurred with the official end of the housing reform and has led to the complexity and diversity of the community's evolution. However, it should be notified that despite of the fact that the housing reform officially ended in 1998, the change within XNVC does not reach its climax until the factory moved away physically in 2015.

As described in Section 1.2, the national policy, namely, "Guiding Opinions on the Separation and Handover of 'Three Supplies and One Management' (sangongyiye) in the Living

Quarter of State-owned Enterprises" ([2016] No. 45), has had a crucial impact on the management of the separated work-unit community, XNVC, of course is included. And like many other work-unit communities, the transfer of "One Management" in XNVC is quite complex and it is difficult to be handed over thoroughly and quickly.

Nevertheless, it is exactly during this gap period between the two turning points and the successful handover of "One Management" that the power of the self-organizing of the community is the most obvious and diversified with the involvement of multiple and complex management crowds, unlike the relatively stable and simple process before.

The pros and cons of the management of XNVC could be then observed very intuitively through the physical performance within the community. Based on field investigations, among three work-unit community cases, XNVC is the relatively well-maintained one with the cooperation of different role players, which makes it an illuminating brilliant case. In fact, just like most of other work-unit communities, the management of XNVC has also gradually been becoming more and more blurred since the official end of the national housing reform in the late 1990s. And XNVC actually fell into a terrible chaos when the working quarter moved away and withdrew from the community management in 2015. But it finally succeeded in stabilizing under certain inner forces within four years with the cooperation of different role players.

For instance, the chaos caused by the free parking at the beginning finally was dealt with the establishment of homeowners' self-governing management committee, who hired a property management company to draw parking lines and charge parking fees while offering negotiated parking principles for residents. However, it should be pointed out that the property management company here undertakes only a management function, not the normal function, which can only

be enjoyed by the work-unit community after the handover of "One Management" to specialized enterprises or institutions.

To better illustrate and visualize the administrative evolution within the community, the current distribution maps of different kinds of public infrastructures will be marked on the current site plan of the community, such as the open space, the non-motor vehicle parking sheds, trash cans, parking lots, and the changes in the management of these facilities over time can be understood through the conversations with administrative staffs as well as local residents. It should be clarified that the open space will be further analyzed in the later community-level section of the spatial morphological analysis and there would be no more details here. Besides, spontaneous constructions by residents themselves that are out of the administrative control will be analyzed too, which are often classified as illegal constructions in the country.

With photos taken from the community, current situations of these public infrastructure facilities and illegal constructions will be judged, which can reflect the pros and cons of the community management. [Figure 4-16, Figure 4-17]



Parking lots



Trash cans



Figure~4-16~The~distribution~and~situation~of~public~infrastructure~facilities~in~XNVC

Illegal Constructions: 1. Illegal extensions at the first floor of the buildings (7 types)

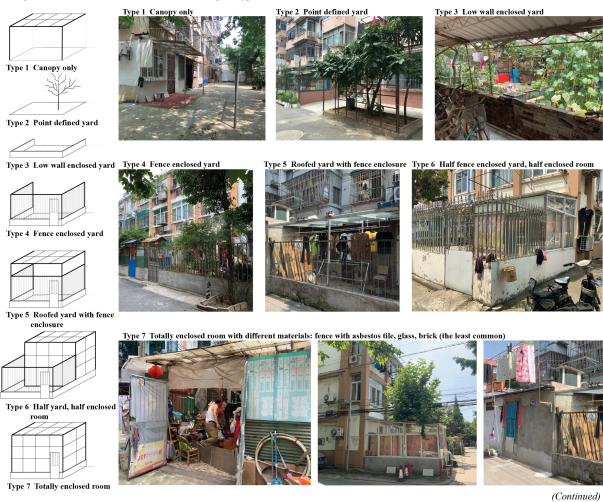


Figure 4-17 Illegal constructions in XNVC (Continued)

2. Other illegal constructionns

Self-added room

Self-added space on the North side

Self-added storage space

Enclosed balcony

Extended windows (as stoves)

Fast Bungalows were constructed by the Factory, which is not illegal, but the partial extensions are illegal, such as the second layer, the blue board enclosed room.

Figure 4-17 Illegal constructions in XNVC (The End)

Judging from Figure 4-16, it can be seen that the quality of non-motor vehicle parking sheds varies. Most of them are relatively new, especially the newly built Mingyuan in 2019 by the management department, with their own charging piles and residents would pay certain fees to charge their electric bicycle. But certain sheds are old and without charging piles, in which residents sometimes have to pull the charging board from their own apartment to the shed and it is actually very dangerous. Regardless of the quality of these sheds, the number of them is large and they are scattered equally in the community, which can meet the parking needs of each

(The End)

household. And it should be pointed out that the electric bicycle is an important transportation mode in the country, especially for those elders living in old communities such as XNVC.

As to parking lots, despite of the limit parking space within the community and basically every available space has been occupied by cars, it can be seen that the limited and precious parking space is specially divided by the management department. Some of them are exclusive parking space with license plate numbers written on the ground, and some are without. Overall, there is an order to the disorder of the parking within the community. As to the trash cans, due to the fact that a private company is hired to be responsible for the garbage recycling and cleaning, the number of trash cans is enough, and they are well distributed and maintained.

Figure 4-17 shows the situation of illegal constructions within the community. Despite of the fact that these constructions are against the law and should be tore down, it has to be admitted that they actually reflect the real living needs of residents and should be treated as an important reference for the later retrofitting of the community. For instance, in XNVC, the most commonly seen illegal construction is the extension at the first floor of the building and almost every building has such an expansion. Besides, they are following certain default construction rules, which can be categorized into seven types in Figure 4-17, namely, canopy only, point defined yard, low wall enclosed yard, fence enclosed yard, roofed yard with fence enclosure, half yard and half enclosed room and totally enclosed room. These illegal extensions range from simple point defined yard to a complete room, and various enclosing methods are involved, which reflect different living needs of residents. During the field investigation, it is found that the majority of residents are taking these extensions for granted, although certain residents living in upper level might complain about it, deeming it unfair. In fact, in subsequent investigations of other similar communities, the author found that the first-floor expansion is actually a very

common operation. In some communities, the construction department has already taken the first-floor expansion into consideration and constructed them officially from the beginning, instead of the later unauthorized illegal construction by residents themselves. In XNVC, there are also some other kinds of illegal constructions, including the self-added room, storage space, enclosed balcony, extended windows as stoves, and extensions in East Bungalows. But overall, the number is few and less obvious. Their specific situation can be found in Figure 4-17, which will not be described in detail here.

In the meanwhile, changes in the management of these public infrastructure facilities over time can be obtained through questionnaires, especially after the two key turning points. In XNVC, as to the parking issue, in early times, there were few cars and residents would park casually. Then the parking problem began to appear with the increase of the number of cars. In 2015, the factory moved away geographically. Internal contradictions were large and fell into a vicious circle. On the one hand, since original public service buildings in the community were mostly rented out for business, the number of external vehicles increased. On the other hand, original residents were not charged parking fees before and they were reluctant to pay for parking now. In 2017, the homeowner's self-governing management committee hired a property management company. The company started to charge parking fees in the community, and they have adopted a special parking mode, in which customers or guests can use the parking space of residents who are out for work in the daytime, and residents can use their parking space when they are back from work. Besides, family members of residents are free to park within 3 hours. Since then, the parking problem of the community has been solved. However, it should be pointed out that property management company is only responsible for the management of the parking in XNVC, and the community is actually adopting an autonomous management mode.

Residents do not need to pay, and the parking fees gained by the company can be used to pay security guard wages, install the monitors, etc.

As to security guards and monitoring, in the past, the security department of the factory was in charge. In 2015, the factory moved away, the situation fell into a chaos. In 2017, the property management company mentioned in the parking section was hired with a three-years' contract. In 2018, after one year of management, the company installed monitors across the community after they had a certain income by charging parking fees.

When it comes to the garbage issue, in the past, the street office was in charge and they hired and paid the cleaning staff. In 1997, after bidding through the market, one private company was hired, who then began to undertake the work of hiring the cleaning staff and consigning garbage. The street office pays the company and the residents' committee coordinates the collection of the household garbage fees, which would appear on residents' water bill.

As to illegal constructions within XNVC, they occurred intermittently in the community, from the beginning to the present. And as mentioned earlier, the first-floor extension is the most common one both before and after the two turning points. Together with other kinds of illegal constructions in the community, all of these actions might reflect the real living needs of residents. However, it should be clarified that there exist conflicts over the first-floor extensions, especially when it comes to fairness and the upper floor residents would complain about it.

In a word, after the working quarter moved away physically in 2015, the newly formed administrative organization in XNVC has been playing a significant role in maintaining the community. As the administrative organization chart of the community in 2019 shows, main participants include the Party committee in XNVC, residents' committee of XNVC, homeowners' self-governing management committee, property management company, and

residents themselves. [Figure 4-14] Among them, the cooperation of residents' committee and homeowners' self-governing management committee is the key factor for the community to evolve from chaos to order after the factory moved away. And in fact, the quick formation of the latter is not found in the other two case work-unit communities.

4.1.1.2 Morphological evolution

The analysis of the morphological evolution of XNVC consist of the immaterial social morphology and the material spatial morphology. As described in Section 3.2.2, for the social morphological evolution, population composition changes and property right changes are selected as two key elements. For the spatial morphology evolution, the analysis will be carried out at three levels- the building level, the community level and the city level, each of which consists of various elements.

1. Social morphology

On the whole, the social morphology tends to evolve from single to complex, which starts from the national housing reform and reach the climax when the working quarter moves away geographically in 2015, which is similar to the administrative evolution of the community. To specify, as to the population composition, there is a change from employees and their families only to a mixture of retirees, outside homebuyers and tenants within the community. However, it is found that retired employees from the original work-unit still account for a larger proportion within the current community based on the field investigation.

In regard to property rights, in XNVC, the majority of the housing was sold to original employees of the work-unit during the housing reform period and has since been circulated as

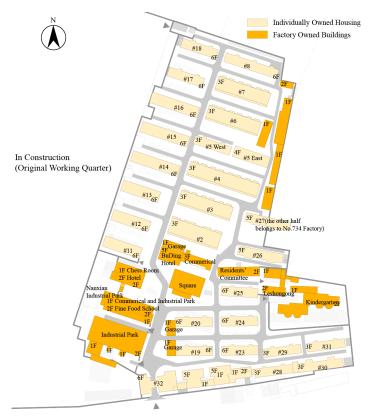


Figure 4-18 The current property right distributions of buildings in XNVC

other newly-built commercial housing in the market. Homeowners can sell or rent their houses freely. Only a few of them still belong to the factory and are being rented to residents. In XNVC, the original kitchen and canteen, auditorium, bathhouse, hostel, and kindergarten have been mostly rented out by the factory to individuals and their functions are generally converted or commercialized, such as being used as hotels, industrial park and chess rooms. At the same time, after the

geographical separation of the working quarter and living quarter, the original working quarter site of the factory was sold to one private developer with the cooperation of the local government, which is to be constructed as a high-rise commercial housing and commercial complex project. [Figure 4-18]

2. Spatial morphology

As described in Section 3.2.2, when it comes to the spatial morphological evolution, which will be analyzed at three levels, the archive is the key data resource and questionnaires for residents and administrative staffs are also available for reference. And fortunately, the archive department of XNVC still exists and owns needed drawings of the community, including site plans in different years and all the buildings' drawings, as well as some later extensions and

reinforcements. Based on these drawings, the author can redraw site plans of XNVC and its different housing unit plans over past decades.

In the meanwhile, judging from historical drawings of XNVC, it is found that almost all the major building constructions, extensions and reinforcement were carried out before the official end of the housing reform in the late 1990s, which is a reasonable assumption since the factory was basically in total charge during that time and the infrastructure department would design and build needed buildings in the community. In contrast, physical changes after that are quite limited. Except for small-scale illegal constructions by residents themselves from time to time, the most common spatial changes within the community come from the public space, such as renovations of the square and the green space, also the renewal or the addition of some facilities within the space. Overall, the evolution of the spatial morphology of the work-unit community is to some extent contrary to the evolution of the administrative management and the social morphology, and generally is a process from diversity to singleness. [Figure 4-19]



Figure 4-19 The diagram of the spatial morphological evolution in XNVC through the 1950s to the 2010s

1) Building level

At the building level, both residential and public service buildings are the research objects. By virtue of drawings gained from the archive, typical housing units constructed in different years were redrawn and listed under the guidance of the typo-morphology approach.

Also, extensions, reconstructions and functional changes of public service facilities are redrawn and illustrated.

a. Residential building

According to their construction years, residential buildings in XNVC can be roughly divided into one phase every ten years, from the 1950s to the 1990s, a total of five stages. As mentioned earlier, there are currently about twenty-nine residential buildings within the community. However, due to the fact that some residential buildings share the same design and construction drawings and three buildings are actually mixed residential and commercial buildings, summed up, there are a total of 9 types of floor plans of the house, excluding those extensions in later years. To specify, five buildings (two types) were constructed during the 1950s, all of which were later reinforced and extended in the 1980s. One building (one type) was built in the 1960s, six (three types) in the 1970s, eight (one type) in the 1980s, and six (two types) in the 1990s, all of which still maintain the layout when they were built, and have not been reinforced or extended officially like the previous two types. The "officially" mentioned here means that some residents might spontaneously renovate their own homes by themselves.

Then pros and cons of these floor plans can be judged through typical indicators, such as the layer number of the building, whether the kitchen and bathroom are private or shared, and whether there is a hall within the floor plan. Synthesizing the abovementioned type division methods and evaluation indicators, a table that integrates all floor plans of housing units in XNVC can be drawn as follows. [Table 4-1]

Table 4-1 The floor plan evolution of housing units in XNVC

								Legend	Bedroom Toilet (later Bathroom)	Bathroom) Kitchen		n) Balcony	Traffic A Entrances
	Layer No.	Kitchen Ba	Bathroom	Hall	1956_#2_3F	1956_#3, 4, 6, 7_3F	1964_#5 East_4F	1972_#30_3F	1973_#28, 29, 5 West_3F	1976_#26 27_SF	1979_#8, 18, 17_6F 1981_#24, 25_6F 1983_#19, 20, 23_6F	1990-1994_#16, 15, 14_6F	1996-2000_#13, 12, 11_6F
1950s	38	× Ag va as	Shared by the same floor	×									
	3F	Individual Individual or Shared or Shared by two families families	ndividual r Shared y two milies	×									
1960s	44 11 0 0 0 0	Individual Individual Widened or Shared or Shared or Shared or Shared or Shared families is the ball families families is the ball	ndividual W r Shared Wr y two as milies as	Videned alkway s the hall									
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1990s	6F II	Individual Individual	L R R vidital (a	Living Room (also used as the walkway)									

It can be seen from Table 4-1 that the layer number of residential buildings in the community has been gradually increasing, from three floors in the 1950s to six floors in the 1990s. The increasing layer numbers not only means the improvement of the construction technology, but also conveys the continuous improvement of the sturdiness and durability of the building.

As to the layout of these floor plans, kitchen, bathroom and hall are chosen as three key indicators in this research. Judging from the table, built in the 1950s as single dormitories, there is no kitchen at all within building No. 2, which can be fully explained by the fact that the public kitchen and canteen within the community were still in use during that time. Employees and their families, especially those single employees, would go to the canteen to eat, thus there is no need to set up a kitchen or dining room in their own houses. Similarly, for single dormitories, the fact that the public lavatory and toilet are shared by the entire floor can be understood. For the other four buildings that were also built in the 1950s, it looks as if each household is a two-bedroom apartment with individual kitchen and toilet. Well, it is true to some residents, but in fact, in such an era when housing is scarce, it is quite normal for two families to share one apartment, which means that two households would share one set of bathroom and kitchen.

As time goes by, public service facilities in the community gradually changed. Some of them have been demolished, and some have undergone functional replacement. The original public kitchen and canteen of the community belongs to the latter. Not surprisingly, in the 1980s, the single dormitories were reinforced and extended, which allows each household or living unit to have an individual kitchen and toilet, small but better than none. As a matter of fact, this building is one of the few ones that are still owed by the factory and rented to households. Because there is only one room per unit, sometimes tenants would rent two or three units to

accommodate their larger families. The other four apartment buildings were also reinforced and extended in the 1980s. In addition to the fact that by this time there had been virtually no two families sharing one apartment, a new individual kitchen and bathroom had been built in the extensions, and the original kitchen/toilet space had been vacant as a hall.

The five buildings constructed in the 1950s are the only residential buildings in the community that were later reinforced and extended officially by the factory. Since the 1960s, basically all the residential buildings have not undergone large-scale renovations as them. As to the floor plan, the building built in the 1960s is a bit similar to the four apartment buildings that were built in the 1950s, but with larger space and the walkway is widened to be used as a small hall. Also, there is a balcony for each household, which is a new phenomenon, meaning that living conditions of households are getting better.

Then came the 1970s, the layout of the kitchen is very similar for the six residential buildings built during this time. As can be seen from the table, in the three types of floor plans in the 1970s, the kitchen is privately owned by one household. But the kitchen space is open and is also used as the walkway. As to the toilet, within the four of the six buildings, two public toilets are shared by four or six households living in one unit on the same floor. But for the rest two buildings, the toilet is small but individually owned. Last but not least, there is no hall in these buildings.

Then in the 1980s, the architectural design is increasingly standardized and modernized, all the eight residential buildings constructed during this time are sharing the same design and construction drawings. As the table shows, each household has an individual kitchen, bathroom and balcony. But there is still no hall.

The 1990s is the last large-scale housing construction era before the official end of the national housing reform in the country. Living conditions at this time have been greatly improved. As can be seen from the table, each household not only has its individual kitchen and bathroom, but also an independent hall, or living room that with larger size.

Throughout the fifty-year changes in the floor plan of residential buildings in the community, it can be seen that the layer number of the building has gradually increased from three to six. The kitchen and toilet were once shared by multiple households, then individually owned by each household. As to the hall, at the beginning, there is no hall space at all, then the widened walkway can be used as a small hall, finally each household has its own independent living room. All these subtle but important changes reflect changes in the living needs of residents. And the design, construction and management departments are all gradually adapting to these changes through the construction of new floor plan and the transformation of the old ones, so as to better maintain the harmonious and healthy development of the whole community.

Among those twenty-nine residential buildings, the five ones that were built in the 1950s have experienced the longest evolution. Also, from the beginning without or shared kitchens and toilets, to the expansion of individual bathrooms and kitchens in the 1980s, the whole reinforcement and extension process of them helps prove the growing living needs of residents and the work done by the management departments. All of these factors make them more typical in this research on the self-organizing process that exists in the work-unit community over years.

Next, the thesis will elaborate on these five buildings (two types), so as to better help readers understand the spatial morphological evolution at the building level within XNVC under a self-organizing logic.

Constructed in 1956, these two types of housing both have undergone some reinforcements and extensions in the following years and are still in use today. The location of the building can be marked on the redrawn site plan, which can help readers have a clearer spatial cognition.

Building No. 2 was initially built as bachelor quarters for employees in 1956, which was equipped with shared lavatories and toilets. There was no kitchen because most single employee would go to the big dining hall in the living quarter to eat at that time. In 1984, it was reinforced and expanded by 1.5 meters on both its north and south sides, and the added space has been used as individual kitchens and bathrooms for each room. In 1991, it was reinforced again. Today, most of the rooms in this building are rented out as



Figure 4-20 The location of building No. 2

one-bedroom apartment. Below is its location map, redrawn floor plans in different years, and some photos of its current situation. Besides, the researcher obtained the permission of one resident in the building and photographed the current indoor status of the one-bedroom apartment. [Figure 4-20, Figure 4-21, Figure 4-22]

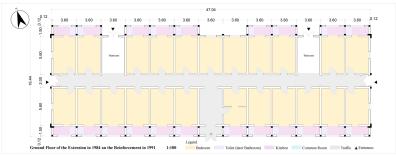




1956 Ground Floor and Second Floor



1984 Reinforced, Ground Floor



1984 Extended, Ground Floor

Figure 4-21 Redrawn floor plans of building No. 2





External Internal corridor

Indoor Photos of Building #2, 1st Floor Zhou, Female, 60 years old, 2 room for 5 people, rental, 1996 moved in.







Bedroom

Extended Kitchen and Bathroom

Figure 4-22 Current situation of building No. 2

Judging from Figure 4-22, it can be seen that this old building with more than 60 years of history has obvious historical traces, such as the protruding reinforcement bars on the façade, and the long interior corridor that reveals the lingering charm of a former single dormitory. But overall the building is not so bad, which actually looks like a well-dressed old man standing there quietly and told a story of time. Entering one typical room, it can be seen that the bedroom and living room are sharing the outside space, and the later extended 1.5-meter balcony serves as a simple bathroom and kitchen. The entire room is small in size but fully functioned, which is more in line with the characteristic of a rental room.

The four buildings- building No. 3, building No. 4, building No. 6 and building No. 7, were built according to the same drawings, and the subsequent reinforcements and extensions were also synchronized. In this type of building, each unit contains three two-bedroom apartments, each with its own kitchen and bathroom but no independent hall. At the beginning, two families would generally share one apartment and the kitchen, bathroom. Later, it was only for one family. In 1982, as the building No. 2, it was reinforced and expanded by 1.5 meters on both its north and south sides, and the added space is used as new kitchens and bathrooms, or balcony. The original space of the kitchen and bathroom was vacant as the new living room.

Today, the majority of the apartment in these four buildings are circulated as the commercial housing in the market as two-bedroom apartments. Below is their locations map, redrawn floor plans in different years, and some photos of the buildings' current status. Also, the researcher obtained the permission of one household living in building No. 3 and photographed the current status of one two-bedroom apartment. It should be noted that this elder resident is a retired worker from the work-unit, who is still renting the room from the



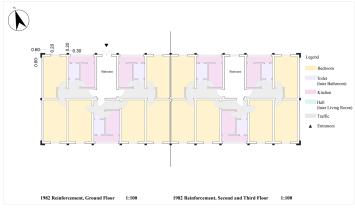
Figure 4-23 Locations of building No. 3, building No. 4, building No. 6 and building No. 7

factory and is sharing the space of the original bathroom, kitchen and living room with her neighbor. However, she did add an individual bathroom in her balcony space, which belongs to the 1.5-meter space expanded in 1982. Also, her neighbor would only come back and live in the apartment for two months a year. [Figure 4-23, Figure 4-24, Figure 4-25] Of course, it should be

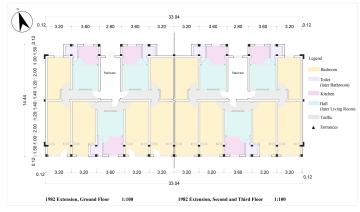
clarified that for all the apartment buildings in the community, there are very few tenants like her who are still renting the house from the factory.



1956 Ground Floor and Second, Third Floor



1982 Reinforcement, Ground Floor and Second, Third Floor



1982 Extension, Ground Floor and Second, Third Floor

Figure 4-24 Redrawn floor plans of the building No. 3, building No. 4, building No. 6 and building No. 7





External Photos









Very poor condition of the stairs

Indoor Photos of Building #3, 1st Floor Sun, Female, 80 years old, Single, Rental and Sharing with the neighbor, Retired worker of Xianlu factory.







Bedroom

Shared Kitchen

Self-added Bathroom

Figure 4-25 Current situation of building No. 3, building No. 4, building No. 6 and building No. 7

Like building No. 2, it can be seen that there are also prominent reinforcement lines on the façade of these four buildings, which are obvious signs of extensions and renovations. The overall appearance of these buildings is similar to building No. 2, which is relatively neat. But after all, it has a history of more than 60 years and its dilapidation can be seen from some internal details, such as the wooden staircases shown in the picture. The deformation of the steps, the erosion of the support column wood, and the fallen paint blocks all mean that these buildings need some reinforcement and renovation.

As mentioned earlier, the old women who is living in the case apartment is still sharing the two-bedroom apartment with the other household, sharing the living room, kitchen and bathroom. Although the co-tenant basically does not live here all year round, for the sake of convenience, she has added her own toilet at the entrance of her house, which is located in the 1.5-meter space extended in the 1980s.

b. Public service buildings

Another kind of commonly found building in one work-unit community is the public service building, such as the auditorium, infirmary, kitchen and canteen, bathhouse, hostel, workers' children school. As described in Section 3.2.2, in this research, two kinds of changes that have happened in the evolution of these public building are observed and deemed to be typical. One is the intermittently extensions and reconstructions, which mostly happened before the separation, and the other one is the change of their functions, which mostly happened when the separation begun. In this research, the analysis of public service buildings will be carried out from these two aspects.

Below is the analysis on the evolution of public service buildings in XNVC. First, physical extensions and reconstructions of typical public service facilities are shown through plan changes over the years. Then some of them are chosen to further explain the functional changes, which mostly started after the official end of the national housing reform in the late 1990s. [Figure 4-26]



Figure 4-26 Changes of public service facilities in XNVC from 1965 to 2019

The evolution trajectory of public service facilities can be seen in Figure 4-26. From the 1960s to the end of 1990s, main changes of these buildings were occasional additions or extensions. In 1965, there was a one-story infirmary, a one-story bathhouse, a one-story kitchen and canteen, a two-story primary school, a nursery and a club. Then as of 1978, there were extensions to some of the original buildings, including the infirmary, the bathhouse, the kitchen and canteen. Also, some new facilities were built, including two two-story school and a three-story infirmary and activity room. From 1978 to 1985, extensions were constructed in the bathhouse and the primary school. In the meanwhile, a two-story auditorium, a five-story hostel and a two-story kindergarten were newly built. But the original nursery, club and one of the two school buildings were demolished. Then in 1998, the original one-story infirmary was demolished. A new two-story bathhouse was rebuilt on the original site of the former bathhouse. Also, a new two-story canteen was rebuilt, which was also located on the original site of the previous kitchen and canteen. In addition, a two-story, partially one-story club mainly serving the elders and retired workers in the community was newly constructed.

Since the late 1990s, extensions or constructions of public facilities have basically stopped, corresponding to the end of the national housing reform policy. Ever since then, changes happened within these public service buildings are mainly reflected in the change of contractors and functional replacement. As can be seen from Figure 4-26 (2012), the bathhouse has been rented out to individuals by the factory since 2000. The auditorium has been rented out to an industrial park by the factory since 2008. Today (2019), the first floor of the bathhouse is a chess room, and the second floor is a small hotel. Since 2015, the original kitchen and canteen have also been rented out to an industrial park by the factory and currently the first floor is a part of the commercial and industrial park, and the second floor is a Fine Food School. The original

three-story infirmary and activity room is also a part of the industrial park, being used as offices. Also, the original five-story hostel is rented out and used as a hotel. At last, the original two-story primary school is used by residents' committee and homeowners' self-governing management committee on the first floor, with the second floor as a gallery and educational training center.

In Figure 4-27, changes of some typical public facilities are shown by a comparison of past and present photos. What used to be an auditorium is now an industrial park. What used to be employees' canteen is now a part of the same industrial park, with the first floor as commercial and the second floor as a Fine Food School. What used to be a bathhouse is now being used as a chess room at the first floor and a hotel at the second floor. What used to be a hostel is now a hotel opened to the public. [Figure 4-27]

2) Community Level

The analysis at the community level in this study focuses on changes of four key elements, namely, boundaries (including the enclosure form, the number of gates and the entrance space, and the street-facing buildings), the traffic organization, the architectural texture, and the public space (including the green space and the open space, such as the public square and the business street).

By virtue of photos of drawings taken from the archive, the research can redraw the site plans of XNVC in 1965, 1978, 1985, 1998, 2012, which are deemed typical. It should be noted that the current site plan (2019) is completed based on drawings of past years plus the field investigation. Then by superimposing and contrasting these site plans of different years, spatial morphology changes that have happened at the community level in XNVC could be judged. [Figure 4-28]

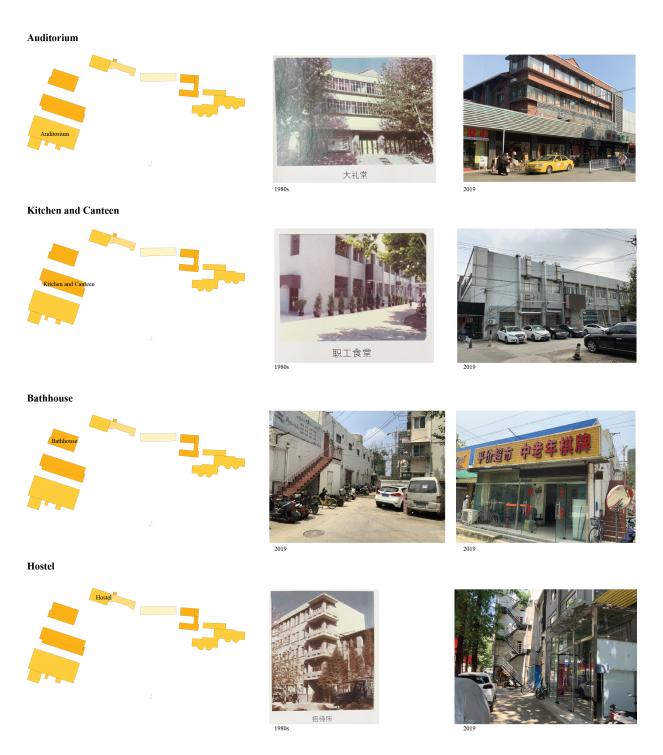


Figure 4-27 Functional changes of typical public service facilities in XNVC

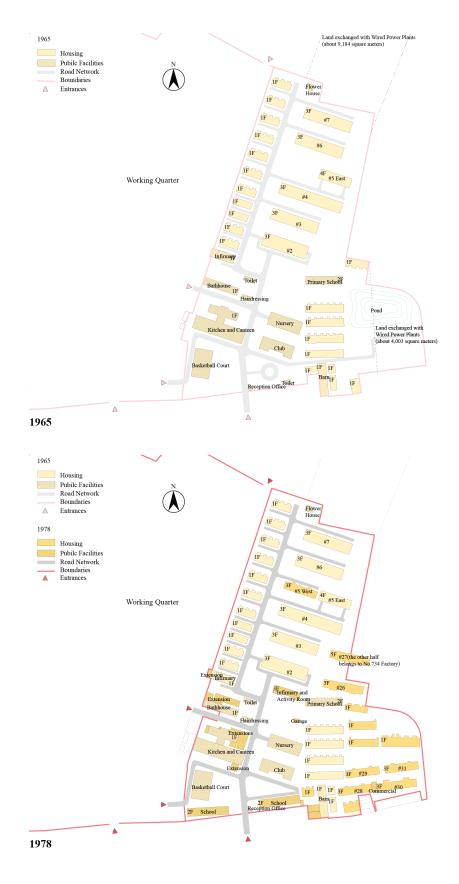


Figure 4-28 Redrawn site plans of XNVC from 1965 to 2019 (Continued)

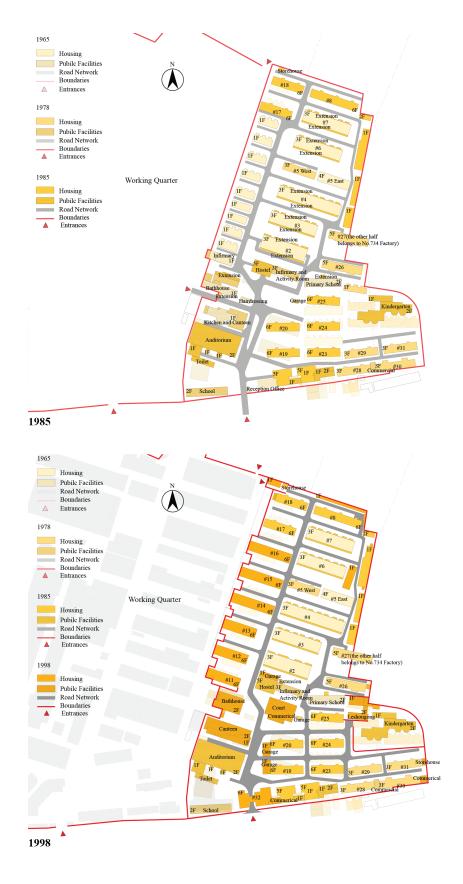


Figure 4-28 Redrawn site plans of XNVC from 1965 to 2019 (Continued)

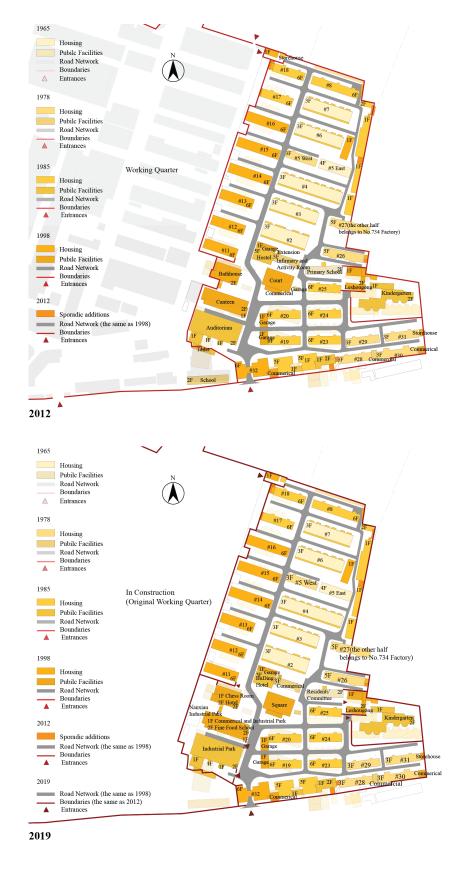


Figure 4-28 Redrawn site plans of XNVC from 1965 to 2019 (The End)

a. Boundaries

In 1965, most of the outer boundary of the community was enclosed by solid walls, only separated from the working quarter by bamboo fences, which made sense since the working quarter and the living quarter actually belonged to one work-unit. As to gates, there was only one entrance on the south side of the community, and there was a guarded reception office at the entrance. Outsiders needed to register to enter the community. After entering the community, one would see a relatively large green space. At the same time, there were two passages at the junction with the working quarter. The management of the entry and exit of these two entrances was not so strict, so that employees can switch between work and life more easily. Since small businesses were not developed in the 1960s and residents in the community were mostly employees of the factory, the street-facing buildings of the community did not open to the outside. Together with other buildings in the community, they formed an introverted architectural group. Therefore, in 1965, by comprehensively considering the three boundary factors of XNVC: the enclosure method, the entrance and the street-facing buildings, it is not difficult to note that this community was actually separated from the surrounding urban land and became a small isolated society.

The drawings of 1978 collected did not indicate the specific enclosure form of the community, but by talking with retired employees of the factory, it can be speculated that in 1978, boundaries of the community were basically enclosed by formal solid walls. However, the number and locations of the entrances of the community did not changed much, as did the street-facing buildings. As in 1965, the community at this time was still a closed small society independent of the surrounding city.

In the site plan of 1985, the southern boundary of the community was obviously straightened due to the construction of urban roads, and the northern boundary was also straightened due to the newly built building No. 8. But overall, the boundary of the whole community has not changed much, which was still surrounded by solid walls. At the same time, one of the original two passages between the working quarter and the community was closed, resulting in only two entrances in the community. But these changes were relatively small. For the community in 1985, the most significant change should be the appearance of street-facing buildings. As can be seen from the 1985 site plan, two new mixed commercial and residential buildings were built on the south side of the community. The side along the street on the ground floor of these two buildings was commercial that opened to the outside. In addition, some small businesses began to appear in the original residential buildings along the southern boundary. These changes were mainly affected by the socialist market system that was adopted in the country since 1978. But it should be noted that the street-facing commercial was limited to the southern boundary of the community, which may due to the fact that only the south side was adjacent to a main city road. In a word, although the community was still enclosed by walls and there were only two entrances, the emergence of street-facing businesses on the south side help illustrate that XNVC has begun to open to the outside, taking its first step into the city, which was a significant change in the evolution of the community's boundaries.

In 1998, another ten years later, most of boundaries of the community was still enclosed by solid walls. In the meanwhile, as the housing reform progressed in the country, houses in the community were gradually purchased by residents, and began to be circulated in the market like other newly-built commercial houses. Residents of the community gradually became mixed, not limited to employees and their families of the factory any more. The only left passage between

the community and the working quarter was also closed. But a secondary entrance was added on the north side, of which the gate was often locked and in fact not many residents would use. Residents would generally enter and exit the community through the original south entrance. Not surprisingly, street-facing commercials are gradually increasing. In addition to previous ones shown in the site plan of 1985, the newly constructed bridge building at the southern entrance was also a mixed commercial and residential building and its ground floor was used as street-facing commercials. At the same time, some small businesses began to appear in the buildings located in the southeast corner of the community. The diversification of residents and the increase of street-facing commercials help illustrate the further opening up of the community to the city.

In 2012, the boundary between the community and the working quarter was adjusted slightly. The southwest corner receded a bit as the auditorium was leased to the industrial park. But overall, the boundary remained unchanged. The entrances remain intact. Besides, for the community, the north and east sides are adjacent to other communities. Only the south and southeast corners have a good location advantage to develop street-facing commercials. Thus, the street-facing commercials of the community did not change much. So far (2019), boundaries of XNVC remain largely unchanged from 2012.

Throughout the changes in the three elements of the boundary of XNVC from 1965 to 2019, including the enclosure form, the number and location of entrances, and the street-facing buildings, the most obvious one is the gradual commercialization of street-facing buildings along the south side, which is a proof that the community has gradually become open to the outside.

b. Traffic organization

As for the traffic organization of the community, the early road network was relatively simple and straightforward. If not considering the poor road condition, the road network in 1965 was actually quite practical and efficient. As can be seen in the site plan of 1965, a central north-south main road run through the entire community and several secondary roads extended from the central road to each building. This "Fishbone" road network is still quite common in the design of modern communities.

Judging from Figure 4-28, it is not difficult to find that, in next few decades, the original fishbone road network in the community has been retained, and the road condition is undoubtedly getting better and better. Also, as a matter of fact, the road network of the community has actually been changed with the change of the layout of the building. With the gradual increase and renovation of buildings in the community, the number of roads in the community has also been increased and adjusted. For example, since 1985, a new north-south road was added to the east side of the community with the increase of building constructions, and the original single-line fishbone road network was expanded into a "Y". In short, the traffic organization in each age can ensure that at least one road leads to each building, which is convenient for residents to enter and exit.

c. Architectural texture

In terms of the architectural texture of the community, it is not difficult to understand that in the 1960s, when the community was just formed, the number of buildings was relatively small, and the height of buildings did not exceed three floors. The floor area ratio (FAR) and density of the community were both low and there are more open and public space in the community. However, even in 1965, when the density of the building is relatively low, buildings in the community can be roughly divided into 4 small groups according to their spatial layout.

On the north side of the community, residential buildings in rows on the left side of the main road is group 1, and residential buildings in rows on the right side is group 2. Group 3 was the scattered residential buildings near the pond in the southeast corner of the community, and the public buildings concentrated at the entrance of the community can be regarded as group 4. In order to facilitate the description of the evolution of the architectural texture in the community, this grouping method will be used in the following description.

Based on the previous description of the spatial morphological evolution of the community at the building level, it can be seen from Figure 4-28 that in 1978, there was no obvious change in group 1. Three building was added in group 2, a three-story building was newly built in the middle and two five-story buildings were built near the eastern border of the community, one of which was shared with the neighboring community. About four one-story and four three-story buildings were added in group 3. As to group 4, three new public buildings were constructed and there were certain extensions to some original ones.

In 1985, two of the one-story buildings in group 1 were demolished and two six-story residential buildings were rebuilt on the original site. A six-story residential building was newly built on the northernmost side in group 2 and there were extensions on both the north and south side of the original five buildings. Four original one-story temporary buildings in group 3 and the original nursery and club were demolished, and five new six-story residential buildings were constructed in rows on the original site. At last, the scattered buildings along the street was also demolished due to the newly planned city road. Instead, two five-story mixed residential and commercial buildings were built. In group 4, in addition to the continued partial extensions, a five-story hostel and a two-story auditorium were newly constructed. In addition to the changes in the buildings in these 4 groups, as can be seen from Figure 4-28, there were also some newly

built buildings with one or two floors at the northeast corner of the community, along the boundary. They seem to be illegal buildings, but in fact they were specially built by the factory to accommodate employees without sufficient living space.

1998 should be the last wave of large-scale construction activities in the community. As can be seen from the site plan of the year, all the remaining one-story buildings in group 1, together with the old one-story infirmary, were torn down, and the original site was rebuilt as six six-story residential buildings. Group 2 did not change much during the past decade. A six-story bridge-type mixed commercial and residential buildings was added to group 3 at the south main entrance of the community. Also, a new one-story, partially two-story, senior activity center was newly built next to the original kindergarten. The biggest change happened in group 4 was the removal and reconstruction of the original bathroom and canteen. [Figure 4-27] In addition, two new one-story electric bicycle parking garages were added on the right side of the main road near the entrance. Finally, another one-story residential building was built in the northeast corner of the community to accommodate employees without enough living space, forming a new building group with the aforementioned ones in 1985.

As mentioned earlier, 1998 is the final period of large-scale construction activities in the community, which echoes the fact that the national housing reform was official ended in the late 1990s. It can be seen from the site plan of 2012 and 2019 in Figure 4-28, compared with the one in 1998, the architectural texture of the community basically remains intact. The only notable change should be the functional replacement of some public service buildings in group 4.

d. Public space

Due to the fact that drawings obtained from the archive are mostly building-related, the depiction of the public space is relatively vague and missing in this research. Luckily, through

the field investigation, the current (2019) situation of the public space in the community can be drawn and illustrated. [Figure 4-29] It should be noted here that the current situation of these public space can also reflect the pros and cons of the administrative management of the work-unit community as other public infrastructures. [Figure 4-16, Figure 4-17]

In this study, the public space in the work-unit community mainly includes public squares, the business street and spontaneous gathering places of residents. As can be seen in Figure 4-29, once you enter the community, you would see the small-scale business street on the left side of the main road and the small garden on the right, which was just constructed through government's "Micro-renovation" project in 2019. At the end of the line of sight, one would see the central square with the largest area among all the squares in the community. Moving forward along the main road on the left, there are two more small squares on the left, which are equipped with fitness facilities, tables and chairs. Moving on, you can see a well-qualified court on the right side of the main road, which is located between two parallel buildings. If you choose to walk along the second main road on the east side, you would see two residents' spontaneous gathering place, and two small squares where residents would hang up their bedding or clothes. Overall, these large or small public space are dotted throughout the community, providing places for residents to relax, chat and exercise and giving the community a strong atmosphere of life. Also, these public space with good situations reflect the efforts and achievements of the management department of the community.

For the earlier era, with the help of questionnaires, this study can make reverse speculations based on the current situation of the public space in the community, with an aim to obtain as much information about the evolution of the public space as possible. At the same time, according to the figure-ground relationship, it can be said that the change of the public space is

inversely related to the building density in the community. That is to say, as the density of buildings increases, the size of the public space naturally would shrink.

To specify, in XNVC, currently there is no special person or agency to take care of the greening in the community. The trees are basically left over from the history. Now it is the responsibility of residents' committee. The committee would organize resident volunteers to pull up weeds, maintain the LD screen, roads, the septic tanks. Public fitness facilities are installed by the government. The Grand Square and smaller squares were built in the 1980s, and ever since then they have been renovated every now and then. For instance, in 2009, the squares and flower beds were renovated by the government. In 2019, chairs were added in squares by residents' committee. Before 2017, the community garden space at the entrance was occupied by parking. After one public opinion survey was done, which lasted from the second half of 2018 to May 2019, the "Micro-renovation" was carried out. The garden and Mingyuan (the one-story electrical bicycle parking sheds) were both renovated and beautified, which is financially supported by the government and is one of the greatest physical changes that have happened within the community after the separation of the working quarter and the living quarter.

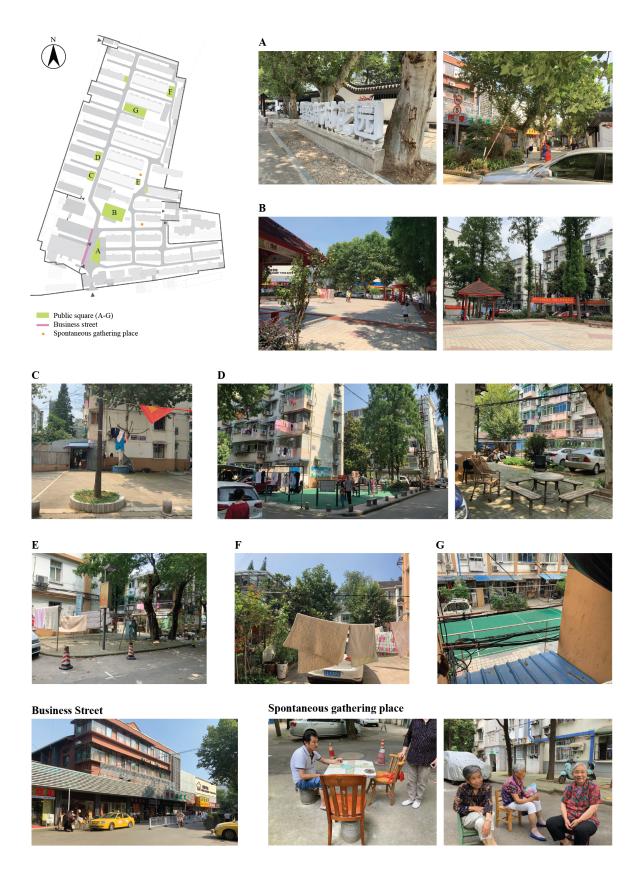


Figure 4-29 The analysis of the public space in XNVC

To sum up, in the past 60 years, the east, west and north borders of the community were basically surrounded by solid walls. Only the south border is adjacent to one city's main road since the 1980s. As a result, buildings along the south border have a certain commercial value. Together with the newly built mixed commercial and residential buildings along the city's main road, the southern boundary of the community has been gradually opened to the outside. In the meanwhile, the interior spatial layout of XNVC was becoming more and more crowded and miscellaneous with the addition of new buildings, extensions on existed buildings as well as the functional changes of certain public service facilities. Especially after 2000, functions of public buildings were mostly replaced. For instance, the hostel is used as a hotel, the auditorium is a part of the industrial park, and a business street is newly formed at the entrance. All of these social functions are attracting outsiders to enter the community, which increase the openness of the community and help it gradually integrate into the surrounding city. As the architectural layout changes, the road network would be changed and adjusted as well. For the public space, although it decreases with the increase of the building density, the quality has been gradually improved with time going by.

Then it can be maintained that, in XNVC, these changes can help prove the existence of the self-organizing force within the community. People's increasing demand for more living space, for smoother and more practical road systems, and for more practical public service facilities, as well as the factory's demand for more profit gaining by renting out public service buildings, are all acting as the dynamic vitality for the self-organizing process. It is noteworthy that with the original public service buildings being rented out to individuals, their functions are becoming socialized, such as being used as the hotel and offices, which would attract outsiders into the community and help promote the formation of the inside business street. This is one key

factor that is promoting the open of the community and its integration into the city, which can help prove that the overall evolutionary trajectory of XNVC is an "un-gating" process, from the totally enclosure status at the beginning to a more open status, primarily after the end of the national housing reform around the late 1990s.

3) City Level

To sum up, the above analyses of the spatial morphological evolution of XNVC at the building level and the community level help prove that there exists the self-organizing force within the community during its evolution for more than 60 years. Without specific interventions from the outside and driven by this force, different elements in the community, including management departments, residents, buildings, boundaries, road networks and the public space, have been interacting with each other and promoting the evolution of the community. In fact, to simplify, this self-organizing development process is composed of a series of "problems (contradictions) arise- problems (contradictions) solving" process.

Although listed with the building level and the community level analysis, subsequent studies at the city level are a bit different from the two. In fact, its role in this research is similar to the analysis at the national level in Section 3.1. As with key national political backgrounds, housing-related policy changes and summarized typical housing and community types at the national level, the spatial morphological evolution at the city level also acts as "non-specific interferences" from the outside. To specify, the city-level spatial morphology changes, including the development of the surrounding plots, road networks and the public space, have been influencing the self-organizing process of the community in a non-specific way. "Non-specific" here means the impact is not specific to the community but has an unintended impact on its development. As we all know, due to the overall planning and development of the city, the plots,

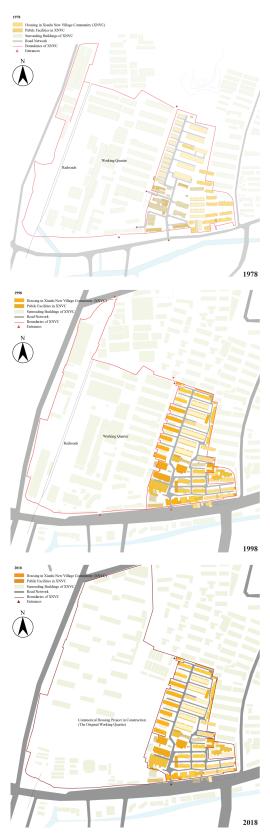


Figure 4-30 The spatial morphological evolution around XNVC from 1978 to 2018

the road network and the public space surrounding the community may change accordingly. However, the purpose of these changes is to serve the development of the entire city, but it may have a radiation effect on the development of the community.

According to the collected data, the distribution of plots and urban roads surrounding the community in 1978, 1998, and 2018 can be redrawn. [Figure 4-30] By comparison, their evolution and impacts on the community can be obtained. It can be seen from the figure that changes have been happening around the community. First, the road network, especially the city road at the south entrance of the community. In 1978, it was relatively narrow. Then by 1998, it was widened as an urban main road and buildings along the southern boundary of the community was also affected. Some of them had to be demolished to make way for the road. Then plots around the community are gradually changed too. Judging from Figure 4-30, the northeast side of XNVC is also a residential area, in which the building density has been gradually increasing. The west side of the community was the working quarter of the factory. But in 2018, with the geographical

relocation of the factory in 2015, the site was sold to the developer, and the planned commercial housing project is about to be completed.

All these changes indicate that the urban development near the community is becoming more and more mature with the accompanying construction and improvement of various supporting urban facilities. For example, the newly added subway or bus lines surrounding the community, the newly appeared public service facilities such as commercial, medical, sports and cultural facilities within a certain distance from the community, and the newly emerging open space such as public square, parks, green space and business streets will all attract residents of the community to go out and merge into the city, rather than confining their living circle to the self-sufficient community as in the work-unit era. As a matter of fact, this can be regarded as the second key factor that is promoting the open of the community and its integration into the city.

The thesis will next analyze the current situation around the community, so as to prove the maturity of the surrounding city and its attractiveness to the community.

Based on the field investigation, it is found that for residents of XNVC, in which the elders occupy a larger proportion, the most popular modes of transportation include walking, riding electric bicycles and taking the bus or subway. In this research, the spatial scope of this research at the community level is defined as the area that can be reached within 10 and 15 minutes by walking, which is about 800 meters and 1,200 meters around the community. The needed data can be collected through Baidu map and Amap.

Then different elements are chosen as analysis carriers under the three categories, namely, the surrounding plots, the surrounding road networks and the surrounding public space. The current status of the surrounding plots can be seen from the 2018 drawing in Figure 4-30. The road networks mainly refer to the subway lines and the bus lines. The public space consists

of public service facilities and the open space, with the former includes commercial, medical, educational, sports and cultural facilities, vegetable markets and the latter include public squares, parks, water bodies, green space and business streets.

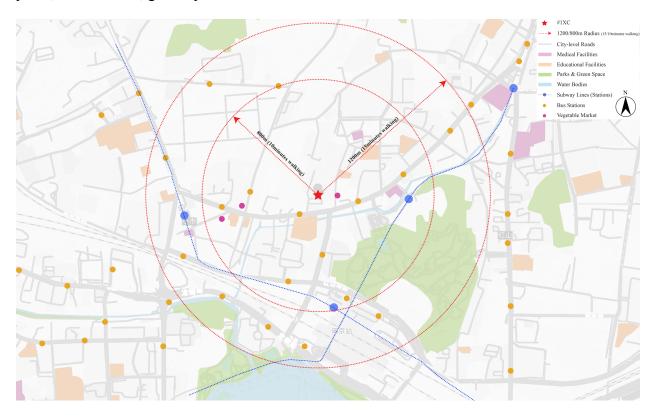


Figure 4-31 City-level surrounding road networks and public space of XNVC²

Judging from Figure 4-31, within a 15-minute walk surrounding the community, there are 3 subway stations of 2 subway lines, 6 bus stops, 3 medical facilities, 7 educational facilities, and 3 vegetable markets. Also, the nearby Hongshan Zoo and Xuanwu Lake are great advantages as green space and water bodies. The provision of these facilities means that the urban development around the community is relatively mature, so as to attract residents in XNVC to merge and live in the city, not enclosed in the community any more.

4.1.2 Conclusion

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² "Nanjing Xianlu New Village Community _ Details of Xinalu New Village Community | Second-Hand Housing | Rental Housing | Community Consultant (Nanjing Lianjia)." Accessed November 26, 2019. https://nj.lianjia.com/xiaoqu/2511053862135/.

The official end of the national housing reform in the late 1990s and the geographical relocation of the working quarter in 2015 are two important turning points in the evolution of XNVC. Summarizing the above analysis of the administrative and morphological evolution of XNVC in past decades, the following conclusions can be drawn.

- 1) Before the two key turning points, different but specialized departments of the factory in different years are main actors that are involved in the management and constructions of the community. Then came the turning point with the end of the national housing reform, the management mode of the community began to change, especially after the factory moved away physically in 2015. Instead of the factory assuming the main responsibility, more and more role players started to get involved, including the street office, residents' committee, residents, homeowners' self-governing management committee and the property company. And the factory's strength of power is getting weaker and weaker while residents' influences are growing. Thus, the administrative evolution in XNVC in the whole is a process from simple to complex. Correspondingly, the social morphology tends to evolve from single to complex, including the increasing complexity of population compositions and a mixture of property rights within the community. At last, the evolution of the spatial morphology of XNVC is to some extent contrary to the evolution of the administrative management, which generally is a process from diversity to singleness.
- 2) A relatively strong self-organizing pattern exists in XNVC, especially after the separation, which heavily relies on the distinct management mode of the community. The cooperation of different role players within the community are working together to maintain the daily operation of the community. Among those, residents' committee and homeowners' self-governing management committee are playing key roles, which reflect a stronger bottom-up

vitality within the community itself. In other words, residents themselves are the main body of management in XNVC. And there are many traces of self-organizing evolution in the community. For instance, the negotiated parking rules among the homeowners' self-governing management committee, residents and the property management company. To specify, customers or guests can use the parking spaces of the residents who are out for work in the daytime, and residents can use their parking spaces when they are back from the work. Besides, family members of the residents are free to park within 3 hours. Residents do not need to pay, and parking fees gained by the company can be used to pay security guard wages, install the monitors. Also, with the financial support of the local government, there are many renovated public squares in the community, in which residents can chat, rest and relax. Moreover, volunteers can be seen every day in the community, including resident activists, employees in the residents' committee and workers in the homeowners' self-governing management committee. They have played a significant role in the daily maintenance of the public space of the community.

The overall evolutionary trajectory of the community is an "un-gating" process, from the enclosure at the beginning to the more open status, primarily after the end of the housing reform around the late 1990s. People's increasing demand for more living space, for smoother and more practical road systems, and for more practical public service facilities, as well as the factory's demand for more profit gaining by renting out the public service buildings, are all acting as the dynamic vitality for the un-gating process. With the original public service buildings being rented out to individuals, their functions are becoming socialized, such as being used as the hotel and offices, which will attract outsiders into the community and help promote the formation of the inside business street. In the meanwhile, the urban development around the

community is becoming more and more mature, and the accompanying construction and improvement of various supporting urban facilities are attracting residents of the community to go out and merge into the city, rather than confining their living circle to the self-sufficient community as in the work-unit era.

- as XNVC. Before comparing them later, here is some shortcomings that can be observed in XNVC itself. First, while admitting the public space is well-maintained and the overall look of the buildings is neat in XNVC, it has to be admitted that the inner space of some residential buildings is not so satisfactory, especially for those old buildings. More measures need to be taken to improve the current situation, especially the traffic space of the building. Also, residents might need technical and financial support to transform their own living space, especially the bathroom and kitchen space. Some of them might also need to alter their house to gain more living space. Besides, currently there are no elevators in those old buildings with higher floors and it is particularly difficult for the elders to get up and down. Perhaps elevators might be added under the support of the government.
- 5) Last but not least, there are mainly two kinds of construction activities with XNVC, namely, formal and informal. On one hand, China has always been regarded as a highly controlled and regulated society. And it's true that, during the work-unit era, authorities in the work-unit would act formally within the Party's and government's directives and guidelines. However, when it comes to the construction activities in the community, the work-unit would find ways to pursue their own agendas within the overall political structure. And in reality, these actions were bottom-up actions. Specifically, under the premise of satisfying the national policies, leaders of the work-unit would first decide what need to be dismantled and what need to

be built according to the actual living needs of residents in the work-unit community, and then they will report the needs to higher government and only start the construction activities after getting the permission. Thus, these constructions led by the work-unit can be deemed as formal ones. On the other hand, residents would take matters in their own hands to change their environment informally and at times even illegally. Finally, it's worth noting that some construction activities are a combination of the two. For instance, with the implementation of the reform and opening-up policy in the 1980s, the state and the work-unit encouraged the residential buildings along the street to open to the outside. Under the guidance, residents' spontaneous reconstruction activities- opening doors for business, can be deemed as a combination of formal and informal constructions in the community.

4.2 Case 2: Institute of Soil Science Community (ISSC), 71 East Beijing Road, the Living Quarter of Nanjing Institute of Soil Science, Chinese Academy of Sciences

Chinese Academy of Sciences was established in November 1949 and is the highest academic institution of natural sciences in P.R. China, the highest consulting institution of science and technology, and a comprehensive research and development center for natural sciences and high technology. Nanjing Institute of Soil Science is an affiliate of Chinese Academy of Sciences and thus a national level institute. Institute of Soil Science Community (ISSC), which is named after Nanjing Institute of Soil Science, therefore can be categorized as an institution work-unit community. And institution work-unit is one of the three types of work-unit based on their functions. However, although it is called the living quarter of Nanjing Institute of Soil Science, it has to be clarified that the community was once mainly occupied by employees and their families from different institutes nearby, such as the Institute of Soil Science, the Institute of Geography and Limnology, and the Observatory, all of which belongs to

Chinese Academy of Sciences. Today, residents who have been living in ISSC for a long time are basically elder cadres, retired employees and their families of these institutes. Then except for some in-service employees of these institutes, new residents are mainly teachers, white-collar workers and company executives that have moved in mostly because they want their kids to be better educated, which will be further explained later.

The history of ISSC can be traced back to before the foundation of P.R. China. It was originally the living quarter of some institutes of Academia Sinica. The former National Academia Sinica (1928.6- 1949.4) was the highest academic research institution in the Republic of China period and was directly affiliated to the National Government. Six buildings in the community were built during the period of Republic of China and aimed to provide accommodation for the cadres of the institutions of National Academia Sinica, such as Institute of Physics and Institute of Mathematics. Thus, they were designed and built with a relatively high standard. These six buildings- now numbered as building No. 4 to No. 9, were designed by the famous architect Yang Tingbao in the country, built according to identical construction drawings in 1948 and are thus the oldest buildings in the community. Constructed with a brickconcrete structure with gray corrugated tiles and a sloping roof, the façade of these six two-story buildings are covered with cement plaster, and the interior is painted with white stucco. The façade pipelines are messy, but their overall appearance is quite good.³ In fact, in 2017, along with conservation directories of some other types of historical buildings in Nanjing, the Nanjing Planning and Natural Resources Bureau has published a document called Nanjing Historical

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³ "Nanjing Historical Buildings (Historic Lots Type) Conservation Directory (Public Consultation) _Planning Preparation in Advance _ Nanjing Planning and Natural Resources Bureau." Accessed October 11, 2020. http://ghj.nanjing.gov.cn/pqgs/ghbzpqgs/201711/t20171115 874811.html.

Buildings (Historic Lots Type) Conservation Directory and consulted the public opinion. These six buildings are included in the directory due to their significant value.

In addition to building No. 4 to No. 9 that existed before the foundation of P.R. China, other residential buildings were later built intermittently as several other institutions of Chinese Academy of Sciences moved to nearby plots. Among those, building No. 10 to No. 14 were constructed in the 1950s, which are low-rise buildings with two or three floors. The three-story buildings No. 15 to building No. 17 were built in the 1960s, the four-story building No. 18, building No. 19 and six-story building No. 21, building No. 23 were constructed around the end of the 1970s. The six-story buildings No. 1, building No. 2 and building No. 3 were constructed in the 1980s after the demolition of the three original two-level old buildings that were built in the 1950s. Building No. 24 (5F/4F) and the five-story doctor's house were also constructed during the 1980s. Later, building No. 25 (3F/4F), building No. 27 (6F), building No. 28 (5F) and building No. 29 (5F) were built at the end of the 1990s, which is basically the end of the construction of new residential buildings in the community. In the meanwhile, there have been partial additions and renovations on these buildings over the years. On the whole, the construction of residential buildings in ISSC spans nearly 50 years- from 1948 to the 2000s, and partial renovations and additions still continue today. Thus, ISSC has been around for about 70 years and owns a wealth of building types that were built intermittently over years, helping make it a good case study of historical evolution in this research.

According to an authoritative website (*Lianjia*) for selling houses in the country, in ISSC, there are about 915 housing units, the housing price is 71,392 CNY/m² and the maintenance fee

is about 1.0 CNY/m²/month.⁴ When compared with the other two cases in this study, it can be seen that the housing price of this community is relatively high. There are certain reasons for this. First, its surrounding traffic system is quite convenient. It takes only about 20 minutes to get to the city center (*Xinjiekou*) by subway. On foot, it is only about 176 meters to Jiuhua Mountain station of Metro Line 4, and 576 meters to Jiming Temple Station on Metro Line 3.⁵ And the nearest bus stop is only about 130 meters away by walking. Second, it is surrounded by varieties of life supporting service facilities, including commercial, financial, educational, medical, and convenience facilities. Among these, educational facility is undoubtedly the top priority for families with children in the country.

In P.R. China, the enrollment of children and teenagers is mainly based on *Law of the People's Republic of China on Compulsory Education*, which was adopted at the Fourth Session of the Six National People's Congress on April 12, 1986 and became effective on July 1, 1986. The current version is the second amendment of the seventh meeting of the Standing Committee of the Thirteenth National People's Congress on December 29, 2018.⁶ In recent years, the Ministry of Education has conscientiously implemented provisions of the law and firmly promoted the reform of compulsory education, which states that children and teenagers should be enrolled to the nearest school with the exemption from an entrance examination. Taking the promotion of educational equity as the guide and in accordance with the objectives of "schools"

⁴ "Nanjing Institute of Soil Science Community _ Details of Institute of Soil Science | Second-Hand Housing | Rental Housing | Community Consultant (Nanjing Lianjia)." Accessed April 16, 2020. https://nj.lianjia.com/xiaoqu/1411000000660/.

⁵ "Nanjing Institute of Soil Science Community, 71-73 Beijing East Road_ Second-Hand Housing and Rental Housing of Nanjing Institute of Soil Science Community_ Nanjing Anjuke." Accessed October 11, 2020. https://nanjing.anjuke.com/community/view/232926.

⁶ "Compulsory Education Law of P.R. China_ The National People's Congress of P.R. China." Accessed October 11, 2020. http://www.npc.gov.cn/npc/c30834/201901/21b0be5b97e54c5088bff17903853a0d.shtml.

recruit students based on divided districts and students enter a school nearby", they are promoting the formation of a fair and perfect "nearby enrollment" policy across the whole country.⁷

The school district is a zone divided by the education department according to the district's annual source of students. In one zone, students can enter the school without taking an entrance examination by virtue of the "nearby enrollment" policy of the compulsory education. The real estate in this zone is called the school district housing (SDH). There are mainly two types of SDH. The single SDH means either the primary school or the middle school is good enough to attract people to buy a house in nearby communities. And the double SDH means both the primary school and the middle school are good enough. In the country, in order to choose a good school for their children, parents are willing to buy the SDH with a much higher cost. And obviously, the double SDH costs much more than the single one. ISSC is such a single SDH community. The primary school is Beijing East Road Primary School, which ranks among the top ten in public primary schools in Nanjing and the walking distance is only about 420 meters. The middle school is Meiyuan Middle School, which, however, is not so good as the primary school. But for most families, a single SDH is already good enough. Besides, ISSC is quite close to some other famous schools, from kindergarten to university. This geographical advantage is also very important even if their children cannot enter these school with the exemption from an entrance examination. For instance, Beijing East Road Primary School Affiliated Kindergarten is only about 510 meters by walking. Nanjing Foreign Language School (NFLS), a key middle school in Jiangsu Province and one of the seventeen foreign language schools approved by the

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⁷ "Department of Basic Education of the Ministry of Education: Implementation of the Spirit of the National Conference on Basic Education_ Press Briefing_ Government Portal of the Ministry of Education of P.R. China." Accessed October 11, 2020.

Ministry of Education that is eligible to recommend students for admission, is only about 230 meters away on foot. NFLS is well-known for its extremely high enrollment rate, a wealth of quality education and extensive international exchanges. Actually, many parents in Nanjing regard sending their children to NFLS as their highest goal. Last but not least, Southeast University, one of the top universities in the country, is about 1000 meters away on foot.

In addition to its long construction history, the convenient transportation and excellent educational resources around, the typicality of ISSC's internal environment is another key factor in making it a good case in this research. Walking in the community, one would be highly impressed by its rich greening. [Figure 4-32] There are both towering trees standing for decades, and green landscape formed by vegetables or flowers planted by residents. When the author did the investigation there on hot summer days in 2019, she basically could avoid being exposed to the sun directly because of the thick tree shade. Besides, there is only one main entrance on the south side of the community, which faces a main city road. The other three sides of ISSC are all surrounded by other districts. Specifically, there is a mountain on the north, another residential district on the west and the working quarter of some institutes on the east. Thus, under the shadow of those giant trees, surrounded on three sides, plus its deep north-south layout, all of these factors help make the community extremely quiet. Walking in it, it feels like a serene old man who is telling you the long history of the community slowly and quietly.



Figure 4-32 Rich greening in ISSC

However, such a quiet and peaceful atmosphere is disturbed by partial details. [Figure 4-33] First, because elevators are being added to old buildings in the community, which started around February 2019, one would see construction trash every now and then. Also, there is abandoned furniture and decoration garbage thrown by irresponsible residents. In addition to the garbage piled up everywhere, there are also plenty of vacant land, unattended grass, and damaged pavement. Moreover, in ISSC, there is no line drawings to divide the parking space and thus the parking is a bit messy. One would take a chance and look for his own parking lot by himself. Last but not least, there is a serious lack of public square within the community. Residents, especially those who are living on upper floors, have nowhere to go except for their own home. All of these negative factors have lowered the overall living experience of the community, which in the meanwhile reflect the deficiencies in the operation and management of the community. One cannot help but wonder why such a well-located community with splendid innate advantages cannot be better maintained? How has the management mode behind it evolved over the years?



Figure 4-33 Construction trash, vacant land, unattended grass and damaged pavement in ISSC

Life often gives you unexpected surprises. Because some data needs to be further clarified, in September 2020, the author did a return visit to the community, it is so surprising that the community has changed so much when compared with the last year. Here are a few obvious ones. [Figure 4-34] First, the security system at the entrance is obviously much more formal. On the day when the author arrived, there were about four security guards standing at the door while there were only one or two elder security guards at the entrance last year. Besides, these younger security guards were all wearing uniforms and were in a very full spirit. Although the author is still free to enter the community, she was shocked by the momentum. Entering the community, the first thing the author noticed was the workers who were laying grass bricks on the roadside. The original bare curb was also painted. Then the trees in the community have been well trimmed and some wild grass have been cleaned up. One can also see cleaning staffs in uniform cleaning the community every now and then. Finally, it's noticeable that there are now lined and numbered parking space on the ground.

In a word, most of the management deficiencies in some details found during the previous field investigation in the community have been involved at least, if you cannot say significantly improved by the time. Considering that the time has just passed one year since the

author's initial investigation, it is quite surprising that there are such obvious changes within such a short time. Naturally, one would be very curious about reasons behind all the changes. Through an informal conversation with Mr. W, who happened to be on duty in the security room at the entrance and later turned out to be a leader of the newly settled property management company, it is found that this new company begun to settle in the community in August 2020, only about two months before the author's return visit. As he described, various renovations are still in progress, including the greening, side pavement, parking, the installation of charging piles for electric bicycles, and the configuration of dedicated cleaning staff and security staff in the community. And it is highly expected that the public environment in the community will be much more perfect within the next few months.



Figure 4-34 Comparisons of certain physical performances between 2019.07 and 2020.09 in ISSC

In summary, ISSC has a unique history, transportation, location and resource advantages, but its poorly managed living environment, especially the public space, had seriously affected

the harmonious development of the community by the end of July 2020. Looking back at the history, after 70 years of ups and downs, the community still stands there, indicating that it has certain virality. Today, it looks like a sick man who needs medical assistance. Luckily, the disease is curable, the relevant departments have already started to intervene, and the effect is remarkable in just two months. But it must be pointed out that although the current impact is positive, the final result still remains unknown.

Based on the previous field investigation in last year, how to help ISSC get better under the premise of following its original inner development law is the focus of this research. And this internal development law is expected to gain through the study of both the administrative and morphological evolution of the community in the past few decades, with the self-organization theory as a supporting theory and the typo-morphology approach as the primary physicallyoriented methodology. After the return visit, however, there is one more reason to study it, which is closely related to the newly joined professional property management company. How does the company get involved? How the involvement will affect the original evolution of the community? Is the effect destructive, or will it optimize and enhance the natural evolution of the community?... Therefore, on the basis of continuing the original research idea, the author hopes to fully understand the evolution of the community over years, and then put forward certain retrofitting strategies that are in accordance with its inner development law. On the basis of this, whether the company's intervention and transformation strategies are positive or negative can be judged through comparisons. And if it is positive, the mode can be used as a reference for the retrofitting of other similar work-unit communities in the country.

4.2.1 Analysis process

Similar to XNVC, the analysis of ISSC also consists of two aspects, namely, the administrative evolution and the morphological evolution. Relevant data collection heavily relies on questionnaires and archives.

4.2.1.1 Administrative evolution

Different from the other two case work-unit communities, ISSC was not constructed exclusively for employees and their families working in the Institute of Soil Science at the beginning. As mentioned earlier, building No. 4 to No. 9 was actually built in 1948, which were used as the living quarter of some institutions of Academia Sinica, and the majority of the occupants were cadres of these institutions, thus the standard of housing construction was relatively high during that time. In July 1952, the original Soil Research Laboratory of the Central Institute of Geological Survey (1913-1950) was expanded as the Institute of Soil Science. Then since October 1, 1952, the institute has been under the leadership of Chinese Academy of Sciences. After a series of preparations, the institute of Soil Science was officially founded in January 1953.8 However, it was not until 1955 that the institute moved into its current location with the completion of its new laboratory building on the site of the former Academia Sinica. With time going by, several other institutions of Chinese Academy of Sciences also moved in. Together with some other institutes nearby, they have formed a special district of Chinese Academy of Sciences. Correspondingly, more and more buildings have been built in ISSC to accommodate employees and their families from these different institutions. But the majority of residents is from the Institute of Soil Science, which might be the origin of the name of the community. However, perhaps it is precisely because of the complexity of the population in the community, the Institute of Soil Science has not paid enough attention to the community

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⁸ "Warmly Celebrate the 50th Anniversary of Nanjing Institute of Soil Science, Chinese Academy of Sciences!" Accessed October 13, 2020. http://www.issas.cas.cn/sqzt/fzlc/1.htm.

from the beginning. Through conversations with some authorities, it is found that relevant archive records of ISSC are quite scarce, especially when it comes to the administrative evolution of the community.

In this context, the author finally gains the needed historical data through interviews with some credible personnel, online searching and the collation of the author herself. Based on the collected oral and online information, it is possible to draw diagrams of the administrative organization charts of the community in different years. To ensure the accuracy of the data, the author showed draft diagrams to interviewees through return visits and then adjusted them based on their feedbacks. In a word, in ISSC, the oral narrative is one key data source for the administrative evolution analysis, supplemented by the online information. During the field investigation, there are mainly four authoritative interviewees that can offer relevant data for the research. Here is a brief list of their basic information. As the request of them, this thesis will not disclose their private information and will replace their full names with initial letters of their last names. The list is sorted according to the time of the interview.

- Science, has a good knowledge about the development history of the Institute. Although the evolution of ISSC is not separately recorded, some useful information can be inferred from the historical data of the Institute that he provides. Besides, it was he who brought the author into the archive of the Institute to obtain drawing materials of buildings in ISSC, which is crucial for the following study on the spatial morphological evolution of the community.
- 2) **X**, who joined the Institute of Soil Science in 1972 and had been serving in the logistics department of the Institute for a long time, mainly provided oral information on the management department changes of the community in earlier years.

- 3) **D** is the leader of the Property Management Office of X Street Office and has been working in the office since 2010. Starting in 2015, the property management office has been the main management department of the community before the professional property management company stepped in August 2020. He is quite clear about the administrative evolution of ISSC in the last decade.
- 4) **W** is a leading cadre of the Residents' Committee of G community and he started working there in 2013. Similar to D, he is quite familiar with the administrative changes in ISSC during the last ten years. Most important of all, he is quite clear about the intervention process of the newly settled property management company in ISSC and the future development plan of the community.

Overall, based on the primary data collected from them, it is found that the earlier data about the administrative evolution of the community is rather few and vague, and the data after 2010 are relatively rich and clear. This phenomenon is understandable. First, the historical data itself is somewhat scarce in many fields. Second, before 2010, the management of the community was still dominated by the Institute. Over those years, the management mode of the community did not change too much. Most of them were changes of the management department brought about by the adjustment of departments and the reform of leadership and management system of the Institute of Soil Science. But no matter how the management department changes, it has always been under the control of the Institute. Then, as this study assumed at the beginning, with the gradual withdraw of the institute from the community since the official end of the national housing reform in the end of 1990s, the management mode within the community has been becoming more and more complex as more and more parties are getting involved.

Looking back at XNVC, the official end of the national housing reform in 1998 and the geographical relocation of the working quarter in 2015 are deemed as two key turning points for the change of the administrative mode in the community. The situation is a bit different in ISSC. Unlike XNVC, the working quarter of ISSC is still there. But it has to be pointed out that, according to the collected oral information, the institute will soon be moved away geographically within one or two years. However, except for the same turning point as XNVC when the national housing reform officially ended in 1998, there are three more key turning points within ISSC, which are in fact a continuous process of constant exploration about the management mode of the community. To specify, a less professional property management company stepped in in 2010, the property management office of the street office took over the responsibility in 2015, and finally a professional property management company settled in August 2020.

In order to better illustrate the administrative evolution of ISSC in the past seventy years, this thesis thus will take 2010 as a key turning point, when an organization that is independent of the Institute of Soil Science began to intervene in the management of the community. Despite of the fact that the Institute began to withdraw from the community in 2015, the join of the property management company is an important signal that the management of ISSC is becoming more complicated. Thus, the following narrative is also mainly divided into two parts: before and after 2010. Based on the data collected, the author has drawn the evolution of key administrative departments/companies in ISSC from 1953 to 2020. [Figure 4-35]

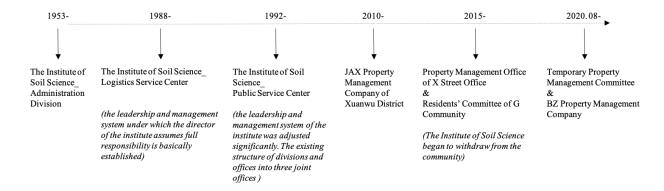


Figure 4-35 The evolution of key administrative departments/companies in ISSC

Before further analyzing these two parts, the Party organization that is closely related to the Institute and the community has to be introduced first. As described in Section 4.1, there are two main lines when it comes to the management of the country, namely, Party committees at all levels under the leadership of CPC Central Committee, and governments at various levels under the leadership of the State Council. And the latter is somewhat obedient to the former at the same level. [Figure 4-3]. Thus, similar to XNVC, the Party organization has been playing a significant role in the management of the Institute of Soil Science, including the community.

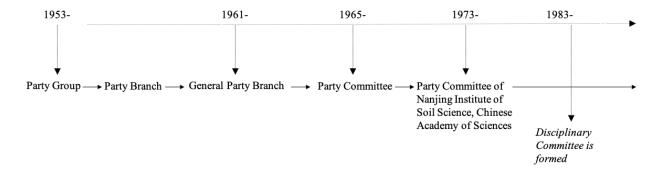


Figure 4-36 The Party organization evolution in the Institute of Soil Science

In Figure 4-36, the development of the Party organization in the Institute is illustrated chronologically. As described earlier in XNVC, the Party branch is the most basic organization of the Party organization, and the Party group is a part of the Party branch and an organization form of managing the Party members under the leadership of the Party branch. It can be seen

that, began with the Party group, the Party organization in the Institute has been growing and developing. In 1973, the Party Committee of Nanjing Institute of Soil Science, Chinese Academy of Sciences was officially established. Since then, connections between the Party, the Institute, and the community have become closer and closer, and the Party has been playing its own role in the management of ISSC from the past to the present.

Under the guidance of the Party organization, the leadership and management system of the Institute has also undergone a long evolution, with several key adjustments. As mentioned earlier, the Institute was officially established in 1953 and moved to the current site in 1955. Based on the online materials **Z** provided, after the Cultural Revolution (1966-1976), the system of the Party committee and the director was restored, during which the system of the director of the institute designated to undertake responsibility under the leadership of the Party committee was used. Then in 1984, the system under which the director of the institute assumes full responsibility was adopted. At this point (1988), the leadership system of the Institute was basically established. The change of the leading group has formed a customary system, and the subsequent sessions can be smoothly assessed and changed. In 1992, the reform work of the Chinese Academy of Sciences has entered a new stage and the principle that the team should be efficient and capable was put forward, especially that the proportion of managers and technicians should be reduced to less than 7% step by step. Thus, the management system of the Institute was adjusted significantly. The existing divisions and offices was combined into three joint offices, namely: the director's office, including the former accounting office, security section and secretariat section, which coordinates the role of all departments; the office of scientific research administration, including the former science and technology office, foreign affairs office of education and office of the academic council, which oversees the work of the Institute on the

scientific research; and the organization and personnel office, including the former Party office, personnel, discipline inspection, supervision, trade unions, which controls the work of the Party personnel and organization.⁹

So far, the evolution of key administrative departments in ISSC before 2010 can be drawn based on the evolution of the Party organization and the leadership and management system in the Institute, together with X's memories about the management of ISSC. [Figure 4-35] To specify, a department of the Institute named Administration Division has been in charge from 1953 to 1988 and was mainly responsible for the maintenance of housing and the public space in the community. Then in 1988, the leadership and management system under which the director of the institute assumes full responsibility is basically established. Ever since then the Logistic Service Center of the Institute has been the main management department of the community. Finally, in 1992, with the significant change of the leadership and management system of the Institute, in which the existing divisions and offices were combined into three joint offices, a Public Service Center of the Institute was established to take the road of enterprise management, which provides paid services internally and operates independently externally. Ever since then, the Center has been undertaking the responsibility of managing the community.

In a word, the Institute has been the main role player in the management of the community before 2010. However, it has to be clarified that except for the Institute of Soil Science, other institutes of Chinese Academy of Sciences were also involved in the management of the community. After all, residents of ISSC were a mixture of employees from different institutes. But as described earlier, the majority of residents were from the Institute of Soil

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⁹ "Warmly Celebrate the 50th Anniversary of Nanjing Institute of Soil Science, Chinese Academy of Sciences!" Accessed October 13, 2020. http://www.issas.cas.cn/sqzt/fzlc/1.htm.

Science, thus the Institute of Soil Science was mainly responsible for the management of the community, and other institutes had been playing supporting roles.

Then the analysis of the administrative evolution of ISSC after 2010 will be divided by the year of 2010, 2015 and 2020 as Figure 4-35 shows. In ISSC, because of the adjustment of administrative divisions of Nanjing city in 2012, ISSC was under the jurisdiction of another community's residents' committee of another street office before 2012. Also, two different property management companies are involved in the management evolution of ISSC from 2010 to 2020. To facilitate distinction and elaboration, different street offices will be replaced by the first letter of their initials and different property management companies will be replaced by their initials. As can be seen in Figure 4-37, ISSC belonged to J Community of M Street Office before 2012 and then to G Community of X Street Office. However, the administrative organization of ISSC barely changed in both phases. Thus, they are combined into one diagram. [Figure 4-37] Like XNVC, in all the administrative organization charts of ISSC, red fonts refer to the department or personnel involved in the community management and the white text on a gray background refers to the job it does.

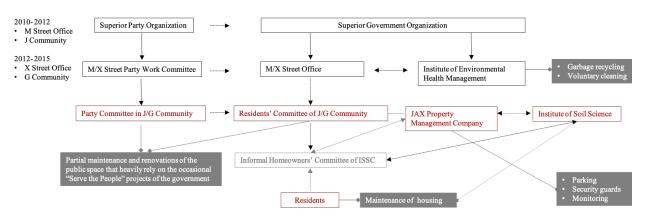


Figure 4-37 The administrative organization chart of ISSC from 2010 to 2015

As **D** described, JAX property management company began to settle in ISSC in 2010, which, however, undertook only the management function instead of the normal service

function. At the first glance, this is a bit like the property management company in XNVC. But in essence there are obvious differences between them. First, while both companies are responsible for the parking, security guards and monitoring of the community, the one in XNVC is more responsible and does the job better. For instance, both of them are responsible for charging parking fees at the entrance, but in XNVC, the company also have drawn parking lines, numbered the parking lots and established negotiated parking principles for residents. In ISSC, however, JAX would actually only charge the parking fee at the entrance and there were no divided and numbered parking lots at all in the community. Second, there is an official homeowner's self-governing management committee in XNVC formed by resident representatives that have signed the Property Service Contract with the property management company on behalf of residents. In ISSC, however, there was only an informal homeowners' committee. As **D** mentioned, the informal homeowners' committee signed the Property Service contract with JAX while there was another contract between the company and the Institute of Soil Science, in which the Institute would offer financial support to the company for about three years. It can be seen here that the Institute was still involved in the management of the community. And X also mentioned that it was not until 2015 that the Institute gradually stopped involving in the management of the community. Third, while the homeowner's self-governing management committee, residents' activists and the more responsible residents' committee in XNVC are working together to make up for the missing service function of the property management company, in ISSC, the situation was not so optimistic. The service function mentioned here mainly refers to the daily maintenance of the public space in the community, such as the greening, cleaning, parking. In ISSC, there is no dedicated person or agency to take

on the job. In short, the community had been in such a relatively negative state from 2010 to 2015.

In 2015, the Property Management Office of X Street Office took over the job from JAX Property Management Company because of the adjustment of districts. Since then, the office has been mainly responsible for the management of the community. [Figure 4-38] As can be judged from the administrative organization chart in Figure 4-38, the parking, security guards and monitoring of the community became responsibilities of the Office since 2015. But unfortunately, the handover did not bring too many changes to the community. To be honest, the Office didn't do much better than JAX. The author talked with an 84- year- old women during the field investigation in July 2019. She has been living in the community since 1959 and said that the community was actually in a state of "sanbuguan". The Chinese word means that none of the three parties care about the community, including the Property Management Office of X Street Office, the Residents' Committee of G Community, and the Institute of Soil Science.

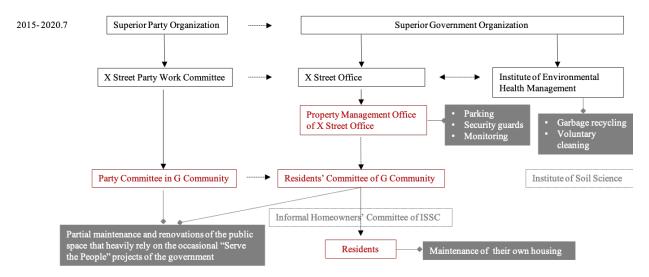


Figure 4-38 The administrative organization chart of ISSC from 2015 to 2020.7

By comparing Figure 4-37 and Figure 4-38, it can be seen that from 2015 to July 2020, the parking, security guards and monitoring have been loosely managed by the Property

Management Office of X Street Office, which is similar to the function of JAX company during 2010 to 2015. For both phases, the garbage recycling of the community is the job of Institute of Environment Health Management of the District and they would voluntarily help clean the community occasionally. Besides, the Institute of Soil Science has basically withdrawn from the management of ISSC since 2015 while before the handover the Institute was still involved in, such as signing contract with JAX company and helping their retired employees maintain their houses. Moreover, the informal Homeowners' Committee performed practically no function at all during this time. In the meanwhile, the Residents' Committee of J/G Community would occasionally maintain the public area of the community under the guidance of the party committee in both phases, such as the installation of security doors and the renewal of stairwell windows. But as **W** described, the maintenance heavily relies on the "Serve the People" projects of the government, which is not specific to the community, thus there is a great uncertainty.

The true situation of ISSC might be better displayed through photos of public infrastructure facilities in the community during that time (photos were taken in July 2019), including the newly-added elevator, green/open space, parking lots, trash cans, and the non-motor vehicle parking sheds. [Figure 4-39]



Figure 4-39 The distribution and situation of public infrastructure facilities in ISSC (July 2019)

The project of adding elevators started in February 2019 at the initiative of the government and residents would make the decision by themselves. The construction of an elevator is expected to cost about \$20,000, and the government and households each contribute half. However, only if all the homeowners of one building agree, can the project be implemented

after they sign the contract with the elevator company. As long as one household disagrees, the elevator cannot be added. Generally speaking, residents living on the first and second floors tend to oppose and those living on higher floors are more supportive. In the process of their negotiation, there may be conflicts. Residents' committee may participate in the mediation, but they do not choose either party. Thus, it is basically residents themselves who make the final decision. Therefore, it is understandable that there is no elevator added to some buildings in the community. But the situation of the west unit of building No. 3 is a bit different, which cannot be added an elevator because there is a small one-story house in front of the building, thus there is no enough space to add an elevator. About the negotiation process, **W** mentioned that the process would be much smoother if residents living in one building have known each other for a long time. For example, if they are all retired employees from institutes of Chinese Academy Science, the one living on the first or second floor would be easier to be persuaded with a lower compensation.

In the long run, the construction of elevators is very conducive to the harmonious development of the community. It is an autonomous and spontaneous act of the residents at the initiative of the government, which is practical and beneficial. Moreover, it can be seen that the act is actually of little relationship with the Property Management Office of X Street Office or the Residents' Committee of G Community, instead, it is mainly implemented through the cooperation of residents and the elevator company. Thus, it is actually a reflection of the internal self-organizing power of the community. To specify, the non-equilibrium between the lag of functions and the changes of residents' demand acts as the main power resource for the continuous evolution of the self-organizing system. And in this case, the pursuit of the

convenience of going up and down stairs of residents who are living in upper floors is driving the elevator to be added to buildings.

Public space includes the green space and the open space in this research. And the open space mainly refers to public square in this case. As can be seen in Figure 4-39, the greening in the community is actually quite abundant, including the towering trees, the quiet tree-lined path, and the potted plants cultivated by the residents, which is also one of reasons why ISSC is chosen as a case study in this research. However, it has to be admitted that these greening is actually quite lack of special care. There is a mess in the rich greenery, with branches and leaves growing randomly, falling leaves stacked, and weeds growing. The natural growth of these plants has a good side, which can make people feel the smell of nature. But it has to be admitted that for urban residents, the harm is greater than good. For instance, the random trees and grass tend to attract pests such as wasp, reptiles and mosquitoes, and may breed a variety of harmful bacteria. All of these are quite detrimental to environmental hygiene and would affect residents' physical and mental health. In addition, there is an obvious shortcoming that cannot be ignored in the community, that is, the serious lack of the public square. It can be seen from the photo that those larger open space in ISSC are overgrown with weeds or occupied with construction trashes, which basically are in an abandoned state. The only small fitness square is unfortunately being demolished. Thus, there is a lack of communication and activity space for residents in the community, which need to be well considered when developing retrofitting strategies for the community.

As before the handover, there are no clear parking space divisions either during this time. Car owners would look for the parking space by themselves, thus the parking is relatively chaotic in the community. As shown in Figure 4-39, in addition to some default parking space that is

more regular, due to the missing of parking lines, most of the parking is not standardized. As long as there is open space, there may be parking there. By the way, it should be mentioned here that there are no professional security staff in the community during this time. During the filed investigation in the summer of 2019, the author learned that at the entrance, in addition to a former employee of JAX Property Management Company who has an official contract with the company (currently retired), the other security guards are later hired by the Urban Management Section of the Street Office after 2015. But there is no formal contract between them. These security guards are generally retired workers and their wages are not well guaranteed. Perhaps it is just because of this that the management of the entrance is rather lax, and they are basically only responsible for charging parking fees at the entrance.

Then as for the garbage problem in the community, it is mainly the Institute of Environment Health Management of the government that would enter the community to collect the garbage. But they are not responsible for the cleaning of the fallen leaves and other litters in the community. If they do, it's voluntary. As the diagram in Figure 4-39 shows, the distribution of trash cans in the community is relatively enough, but the overall quality is not high. Also, the location is not fixed. The next day when author returned, the trash cans might be moved to another place. Besides, due to the lack of dedicated cleaning staffs, some construction garbage, together with other litters in the community, cannot be handled with in time.

As to the non-motor vehicle parking sheds, it is said that they were added about three years ago (2017). As can be seen in Figure 4-39, the distribution of the shed is regular, and the overall appearance looks relatively new. Observe carefully, however, it is noticeable that there are no charging piles at all in these parking sheds. And residents who wants to charge their electric bicycle in the shed are pulling the charging board cable from their own home upstairs,

from the window all the way to the parking shed. Moreover, most of the vehicles parked in the shed are bicycles. The reason is that most residents would take their electric bicycles upstairs and charge them in the hallway or at home because of the inconvenience of charging in the parking shed. Undoubtedly, both practices are quite dangerous. Measures must be taken to change the situation, such as adding charging piles in the parking sheds.

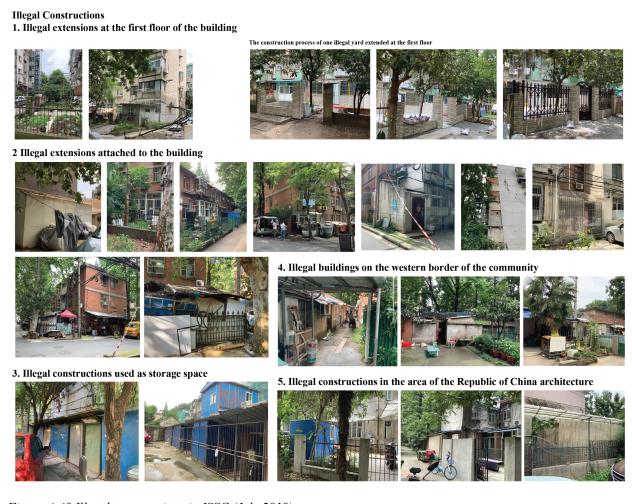


Figure 4-40 Illegal constructions in ISSC (July 2019)

Except for public infrastructure facilities, the appearance and conditions of illegal constructions in the community also can reflect the management situation of ISSC. [Figure 4-40] As the figure shows, there are mainly four types of illegal constructions in ISSC after the foundation of P.R. China. First, the extensions at the first floor of the building, which is the most

common one. Interestingly, during the two-month field investigation in the summer of 2019, the author witnessed the completion of one yard extended at the first floor. Without the need to get the permission of particular administrative departments, residents living on the first floor would generally fund, design and build the yard themselves. In fact, this kind of construction has been happening from time to time from the past to the present, which is a reflect of people's need for more private space. Second, there are some illegal extensions in other parts of the building, such as the small room built against the gable wall at the end of the building, the small glass-enclosed space at the entrance of the first floor, the balcony enclosed with glass or bricks by residents living on higher floors. In addition, due to the later extensions of some buildings, there are some recessed space on the building façade. Then the first-floor residents would generally enclose the recessed space for their own use. The enclosed space in this type is generally more formal, such as being used as a kitchen, a hall or the storage room with doors. But as can be seen in the picture, some other extended space that are attached to the building seem to be very dilapidated, as if they were built by stacking up a few boards at random. The safety, privacy and aesthetics of them are relatively poor when compared with the former types. Third, there are also some neatly arranged constructions, which are often used as storage space. But the overall quality and utilization rate are not high. Last but not least, on the west boundary of the community, there is a row of one- or two-story building. Despite of their messy appearances, the majority of them were legally constructed by the institutes in the 1980s, aiming to provide more living space for their employees. But among them, some illegal additions and constructions can be seen today.

Finally, the six two-story buildings built during the period of Republic of China also have some late-stage additions. But because they were designed and built with a higher standard for cadres of the former National Academia Sinica before the establishment of the Institute of Soil

Science, they are thus here classified as an independent type. Because of the higher standard, these buildings look like villas and there is an enclosed larger courtyard on the first floor. Thus, the household has greater freedom of construction. As can be seen in the pictures, some residents would build an independent room that is similar to a container in the courtyard and some would add some extensions to the building, at the entrance or against the gable wall.

To sum up, the situation of the community was still not optimistic after the Office took over the responsibility from JAX in 2015. Except that the ongoing elevator addition project is quite promising and exciting, other public infrastructure facilities, including the green/open space, parking, security, cleaning, and the non-motor vehicle parking lots, are all in urgent need of governance and improvement. In addition, the illegal construction in the community is also relatively messy, and there are even some hidden dangers of safety, which also need to be further standardized. Referring to Figure 4-38, it is not difficult to find that these phenomena are mainly caused by the lack and deficiency of the management, which need to arouse the attention and thinking of relevant departments.

In this context, because of the abovementioned management difficulties, and in response to the state's call to upgrade the living environment of old residential areas, the X Street Office began to consider the introduction of a professional property management company into ISSC, so as to realize the handover of responsibilities and get out of the field that they are not so good at. After all, professional work should be done by professional companies.

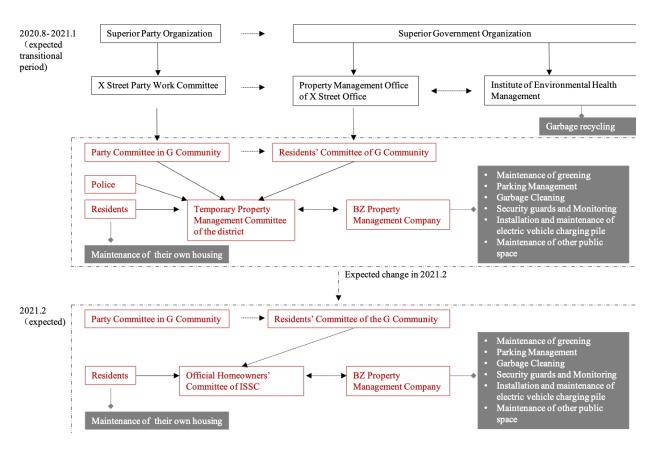


Figure 4-41 The administrative organization chart of ISSC since 2020.8 and the expected one in 2021.2

In August 2020, a professional property management company named BZ began to settle in the community, which is quite different from JAX Property Management Company that was responsible from 2010 to 2015. As described earlier, JAX undertook only the management function instead of the normal service function. BZ, however, is a property management company in the real sense. As can be seen in Figure 4-41, except the maintenance of housing and the garbage recycling, BZ is responsible for the maintenance of almost all the public space in the community, such as greening, the parking management, cleaning, security and monitoring, the installation and maintenance of electric vehicle charging pile, and the maintenance of other public space. And it has to be pointed out that the maintenance of the housing has always been a much more complex problem in ISSC, involving issues such as the housing maintenance fund that is left over from the history. After the Institute withdrew from the community in 2015,

basically homeowners themselves are responsible for maintaining and repairing their own houses. The newly settled property management company has not yet involved in the upgrading of the building either. Even after the six months' transitional period that **W** described, it is very unlikely that the company will interfere. He also mentioned that the upgrading of the building heavily relies on the policy and funding support of the government.

In principle, it should be the homeowners' committee that sign the Property Service Contract with the company. However, as W described, the homeowners' committee in ISSC was never established officially due to certain reasons. First of all, there is a higher mobility of residents in the community. As mentioned earlier, housing in ISSC belongs to single school district housing (SDH) with Beijing East Road Primary School. When their children should go to a primary school, parents would buy the house in the community. But when their children graduate from the primary school, some parents would sell their house and try to buy a new SDH with a good junior high school. This cyclical operation of buying and selling the house, together with the rental housing in the community, are main factors leading to the instability of residents in ISSC. Unlike XNVC, in which a larger proportion of residents are retired employees from the same work-unit and the homeowners' committee is relatively easier to be established due to the tie among them, in ISSC, the proportion of retired employees from the Institute is not too large and thus cannot take the lead. Second, the work of the homeowners' committee is an unpaid voluntary service, and the member is responsible for representing residents to negotiate directly with the property management company. Thus, the member must have a strong sense of responsibility and dedication and dare to speak for the well-being of residents. In ISSC, however, it is difficult to find someone like this. In fact, not just in ISSC, for many old residential areas in Nanjing, work-unit communities included, it is quite difficult to form an official homeowners'

committee and it is obvious that the complexity of the living crowd is the most direct reason. After all, there are not many communities like XNVC, in which the cohesion of the previous work-unit is still strong.

In this context, according to **W**, in order to introduce a professional property management company, thereby greatly improving the living environment of the community, relevant departments, including the street office and the residents' committee, have put forward the idea of setting up a temporary property management committee. The committee consists of the secretary and director of the community, the grid leader, the police and the residents. It signed the Property Service Contract on behalf of residents with the property management company. However, **W** stressed that this committee is just a transitional organization, which aims for the smooth entry of the professional property management company. And it is expected that a formal homeowners' committee can then be formed after about six months, which will be consist of residents themselves and be a real autonomous organization of residents. [Figure 4-41]

In the meanwhile, BZ Property Management Company has been stationed in the community for only two months, during which the greening, parking, security, cleaning and other aspects within the community have been significantly improved and changed, but residents haven't paid a higher property management fee than before. **W** said there is a reason for this. To be honest, the community has been poorly managed for a long time and residents have always been unsatisfied with the living environment of the community, thus they are already very resistant to paying the previous lower property management fees. Actually, during the field investigation in the last year, some residents did mention this point to the author. Therefore, it would be unrealistic to charge a higher amount of property management fees as soon as the company settles in, and residents would be strongly opposed, thus affecting the company's work.

In this context, the company decided to act first: to equip the community with professional security and cleaning staff, to reconstruct the sidewalk, to standardize the parking management, to trim trees, to clear wild grass and to clean up the accumulated garbage. In a short period of two months, the living environment of the community has been improved significantly, and W said that there are good responses from residents. As he estimated, with the environmental transformation of the community going on, residents will gradually recognize the work of the property management company, and at that time they will pay the higher property management fee willingly. As for the company's early investment, on the one hand, the company has its own capital reserves, on the other hand, parking fees charged in the community can also be used. Overall, the management of ISSC is currently in a transitional phase and is expected to be fully formalized within about six months. By that time, all the public space in the community will be managed and maintained by the company, including the maintenance of greening, the parking management, the garbage cleaning the security guards and monitoring, the installation and maintenance of electric vehicle charging pile, and the maintenance of other public space. The street office and the residents' committee can then get out and involve in only when necessary.

It should be clarified that by the time this thesis was written, the company has been working in the community for only two months, and the renovation of the community is still in progress. In addition, the previous article has already roughly showed some obvious changes by comparing photos of the community in July 2019 and September 2020. Therefore, the situation of the community after the company settled in will not be further elaborated, after all, it is in an ongoing state.

In summary, although the situation of the community after BZ Property Management Company settled in has not been finally presented, it seems to be quite promising. Thus, the

transfer of the management mode in ISSC is worth learning by other similar work-unit communities. If the reader can remember, the author mentioned a key policy in the case of XNVC, namely, "Guiding Opinions on the Separation and Handover of 'Three Supplies and One Management' (sangongyiye) in the Living Quarter of State-owned Enterprises" ([2016] No. 45). By comparison, it is not difficult to find that for both cases, "Three Supplies" has basically been handed over to specialized enterprises and managed in a socialized mode. But the handover of "One Management" is much more difficult. While an autonomous institution named homeowners' self-governing management committee has been set up successfully in XNVC due to the fact that lots of the residents there once worked in the same work-unit and thus there is a stronger cohesion in the community, ISSC lacks this innate advantage. And it has to be admitted that XNVC is functioning well with the cooperation of the Party committee, the residents' committee, the homeowners' self-governing management committee, and resident activist despite of the lack of a professional property management company. Also, it must be stressed that residents are the main role player in the management of XNVC. But obviously, ISSC cannot copy the mode of XNVC directly. Therefore, the mode W described seems quite practical and promising, which can offer a good lesson for other similar communities in which the quick establishment of an official homeowners' committee is too difficult. In summary, there are mainly three steps in the ISSC mode. First, under the guidance of residents' committee, a temporary property management committee can be formed to sign the Property Service Contract with a professional property management company. Then the handover of "One Management" can be operated as a trial operation without adding additional burden to residents. Finally, when the performance of the company can really benefit the community and residents, the collection of a higher property management fees and the establishment of an official homeowners' committee

can be considered. If this model can be carried out smoothly, it is very likely that residents' committee can basically get out and hand over the responsibility of community management to homeowners and the property management company, thus achieve the successful handover of "One Management" mentioned in the 2016 policy.

Base on the above analysis of the administrative evolution of ISSC from 1953 to 2020, a diagram can be drawn. [Figure 4-42] As described earlier, the official end of the national housing reform in 1998 is a common turning point for almost all the work-unit communities. Then starting from 2010, the management of ISSC has been in an exploration and experimental phase, during which a less responsible property management company moved in, followed by the street office, until August 2020, when another professional property management company stepped in. And it is excepted that an official homeowners' committee will be established after six-month's trial run of the company. At this point, there is a hope that the management of the community will be on the right track.

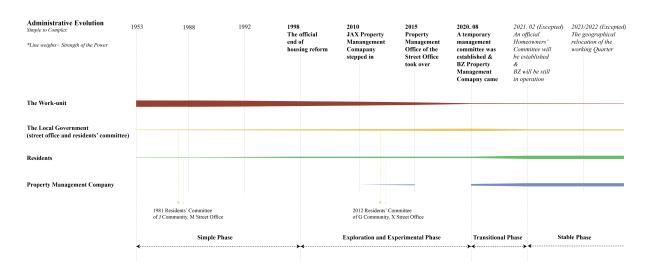


Figure 4-42 The administrative evolution in ISSC through the 1950s to the 2020s

In summary, the whole administrative evolution trajectory of ISSC is a process from simple to complex, and finally stabilized. Before 1998, the Institute was the main role player in

the management of the community. Then its strength of power has been becoming weaker, especially after 2015. And it is expected the influence will be much lower after its physical relocation within one or two years. Correspondingly, ever since 2010, with the gradual withdraw of the Institute, different role players began to involve in, including the property management company and the street-level government. It is noticeable that from 2015 to August 2020, the forces of the street office and the residents' committee are significantly stronger, which results from the withdraw of the Institute, the missing of a property management company, and the inaction of the less active residents. In a word, they have to take the job. Then it is highly expected that after six-months, an official homeowners' committee can be established by residents themselves, which means that residents will participate in the management of their own community with the cooperation of the property management company. In the meanwhile, both the Institute and the street-level government can withdraw from it. At that time, the management of the community will be basically stabilized, and at the same time the autonomous management of residents will be realized.

The analysis of ISSC can help prove the existence of an invisible self-organizing power. To specify, during the past seventy years, there is no specific interference from the outside that works on the community and the community is presenting its current state under the interaction of various internal factors. Community management participants are undoubtedly the most important one among all those factors. As can be judged from Figure 4-42, all the participants can actually be treated as internal factors of the community or non-specific interference from the outside to certain extent.

To specify, before the turning point in 1998, the Institute acted as the main role player.

After 1998, the ownership of the housing within the community belongs to residents, thus, both

residents and the Institute are main internal actors. Then ever since 2010, different parties have begun to involve in, including the Institute, property management company, the street office, the residents' committee, the temporary management committee, the expected official homeowners' committee and the residents. Among all these participants, the Institute, residents and homeowners' committee are undoubtedly the inside factors of the community, who are promoting the self-organizing process of the community in their own way. As for the property management company, while the influence of JAX is quite limited and BZ is aiming to make significant improvements in the community, both of them are working in the community under the permission of residents in principle. As mentioned earlier, JAX signed the contract with both the informal homeowners' committee and the Institute. BZ signed the contract with the temporary management committee (resident representatives included) and hopefully will sign another official one with the expected official homeowners' committee. Most important of all, the property management company is service-oriented. They are hired to meet the needs of residents and improve their living environment gently, rather than destroy or change their living space rudely. Unlike some destructive government projects, such as demolishing the house or changing the traffic network, they would only make minor renovations to the original public space and other details in the community, which would not change the original spatial form of the community. Thus, in theory, their work in the community can be treated as reflections of the self-organizing power, they are "insiders', not "outsiders". Residents' growing demand of a better living environment has promoted their participation. Although BZ company is currently still in the transitional phase, it is very likely they will follow this rule.

At last, the role of the street office, residents' committee and the temporary management committee is a bit special in the administrative evolution of ISSC. Theoretically, the street office

is the street-level government organization, and the residents' committee is an autonomous organization of residents. But in reality, the situation in is a bit different. First, the street office was only directly involved in from 2015 to July 2020, during which the interferences were quite limited and basically took the same mode as JAX. And JAX could be treated as an "insider", so could the street office. In P.R. China, the residents' committee is a grassroots self-governing organization aiming for the self-management, self-education and self-service of residents. Also, generally one residents' committee consists of several different residential districts. But in reality, as described in Section 4.1, the residents' committee is often regarded as a government agency due to its excessive administrative power in the country. In ISSC, the residents' committee does not exercise too much top-down executive power. Of course, there is no denying that their management in the community is not so satisfying. The temporary management committee consists of the secretary and director of the residents' committee, the grid worker, the police and the residents. Therefore, in a word, actions of the street office, the residents' committee and the temporary management committee in the community all are kinds of bottomup interferences, thus cannot be regarded as "specific interference from the outside". However, it must be clarified that the contribution of these three parties to the evolution of the community cannot be ignored, especially during the exploration and experimental phase from 2015 to 2020, when the inside factors, including the Institute, the residents and the property management company are less active especially.

Finally, unlike XNVC, in which an official homeowners' self-governing management committee was established soon after the factory moved away geographically, the complexity of residents in ISSC prevented them from taking over the job from the Institute in time when the institute withdrew in 2015. Thus, the power of self-organizing is relatively weak in ISSC, but not

completely absent. And the addition of elevators is a good point. Now with the arrival of BZ Property Management Company, it is quite promising that inner factors within the self-organization system of ISSC will be quickly activated, especially the most critical one- residents, thus speeding up the self-organizing evolution of the community and improving its living environment and quality faster and better. In the meanwhile, the mode can be learned by other similar work-unit communities in the country. But at the same time, it must be pointed out that the realization of some larger renovation projects, such as the housing renewal and the cable line renovation, still need the financial and technical support of the government. And of course, these projects can also be regarded as the acceleration and improvement of the original self-organizing evolution of the community, instead of as "specific interference from the outside".

4.2.1.2 Morphological evolution

Like the other two cases, the analysis of the morphology evolution of ISSC will also be carried out through the immaterial social morphology and the material spatial morphology. The population composition changes and property right changes are two key elements in the analysis of the social morphological evolution. And the analysis of the spatial morphology evolution will be carried out at three levels, namely, the building level, the community level and the city level.

1. Social morphology

In XNVC, residents were employees of the same factory and their families only at the beginning, and the population was not gradually complicated until the housing reform begun. But the population living in ISSC, as mentioned earlier, was not so single from the beginning. Instead, it's a mixture of employees from different institutes and their families. However, the majority of them were from the Institute of Soil Science and these institutes are all subordinate work-units of Chinese Academy of Sciences. Then similar to XNVC, with the end of the national

housing reform in the country, property rights of the housing began to be transferred to individuals and houses in the community can then be traded in the market as other commercial housing. As a result, the population living in the community is becoming more and more complicated. Today, except for retired employees and their families of different institutes, there are many newcomers, such as teachers, white-collar workers, and company executives that have moved in mostly because they want their kids to be better educated.



Figure 4-43 The current property right distributions of buildings in ISSC

The current property right distributions of buildings in ISSC can be seen directly from Figure 4-43. It can be seen that the majority of residential buildings is owned by residents now. But before the national housing reform ended in the late 1990s, property rights of these housing all belonged to the work-unit (different institutions in this case) and the employees-only residents just needed to pay a rather low rental fee. Then during the

housing reform period, the residents could buy their own house with a relatively lower price from the work-unit and thus own the house. Ever since then, they can sell or rent the house freely in the market.

In the meanwhile, however, except for these residential buildings that were regularly constructed and in line with the housing reform policy, there are also some buildings that cannot sold to the residents during the reform period and thus the property rights of these building still

belong to different institutes. The one-story buildings on the west boundary of the community are the case. As X described, unlike the illegal buildings constructed later in the same area by residents themselves, these building were formally built by the work-unit at the beginning to solve the problem of insufficient living space of their employees. But during the housing reform period, they could not meet the requirement. Thus, they are still properties of different institutes, including the Institute of Soil Science, Institute of Geography and Limnology, and the Observatory. Today, except for the one-story house on the northernmost side, which is used as a storehouse by the Institute of Soil Science, the rest one-story buildings are all residential. These houses have been renting out to their employees from the beginning. But the majority of these employees have already moved out and subleased the house to other low-income families. As for the two-story building along the western boundary, the south side is owned by the Institute of Geography and Limnology, which is currently used as offices, and the north side is owned by the Institute of Soil Science, which is used as the activity room for retired staff, etc. Besides, the two buildings on the north side the community have also been owned by the institute since they were built, in which one is a five-story dormitory building for doctors working in the institute and the other is an office building. At last, some street-facing shops of building No. 18 on the south side are also owned by the Institute of Soil Science.

2. Spatial morphology

The analysis of the spatial morphology evolution of ISSC will follow the same framework as other cases, which includes the building level, the community level and the city level. Obviously, the analysis heavily relies on the historical drawings, especially site plans of the community in different years, and drawings of all the buildings within the community. As mentioned in Section 4.2.1.1, there is a lack of recorded material about the community's

administrative mode. Fortunately, the archive that contains historical drawings of the community still exists today despite of the many moves. However, unlike XNVC, drawings of ISSC are partly missing, especially site plans over the past decades. But something is better than nothing. At last, based on photos of the precious historical drawings took in the archive and the current situation of the community, the online information as well as the oral narratives of the four interviewees, site plans of the community in the 1950s, 1980s and 2000s, as well as the construction drawings and some later extensions of residential buildings in the community are all redrawn and analyzed. In this way, the spatial morphology evolution of the community at the three levels can be figured out, so as to explore the existence of certain law, which hopefully is a kind of self-organizing power in this research.

1) Building level

The analysis of the community's spatial morphology evolution at the building level mainly includes the residential buildings and public service buildings.

a. Residential buildings

By virtue of photos of the historical drawings, floor plans of different residential buildings can be redrawn, in which different indoor space is marked with different colors, such as the bedroom, toilet (later called bathroom), kitchen, hall (later called living room), balcony and traffic. Then similar to XNVC, they are roughly divided into five groups every ten years, namely, 1950s, 1960s, 1970s, 1980s and 1990s.

With the help of site plans of different years, approximate construction years of those residential buildings without construction drawings in the archive can be judged roughly.

Together with those residential buildings with drawings in the archive, the number of residential buildings constructed in the 1950s to the 1990s can be counted. And taking these numbers as the

indicator, the diagram of the spatial morphology evolution in ISSC through the 1950s to the 2000s can be drawn. [Figure 4-44] Overall, building constructions in the community were basically occurred before the official end of the national housing reform in the end of the 1990s. To specify, started in the 1950s, there were less constructions during the Cultural Revolution (1966-1976), then there was a peak in the 1980s, and basically there has been no new constructions in ISSC after the end of the national housing reform.

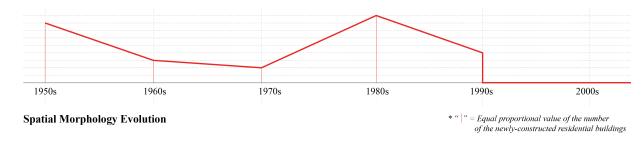


Figure 4-44 The diagram of the spatial morphological evolution in ISSC through the 1950s to the 1990s

There are totally twenty-six residential buildings in ISSC today, in which six buildings were constructed before the foundation of P. R China and are thus not included in the analysis. Also, the original building No. 1 was bachelors' building and had been demolished. But it's worth comparing and analyzing in this case. In the meanwhile, drawings of building No. 13, building No. 14, building No. 25 and building No. 28 are missing. Also, building No. 10 and building No. 11, building No. 2 and building No. 3 both shared the same construction drawings. Therefore, there are totally seventeen buildings (fifteen types) of housing units that can be redrawn, listed and compared. [Table 4-2] As the table shows, without considering the four buildings whose drawings are missing in the archive in this research, four buildings (three types of housing units) were constructed in the 1950s, three (two types) in the 1960s, two (two types) in the 1970s, seven (six types) in the 1980s and two (two types) in the 1990s. Also, the majority of the housing units is still maintaining the same layout as they were built. Only the building No. 12 and 21 have been reinforced and extended officially in later years. The word "officially" is

used here because there are some spontaneous constructions or renovations from the residents over the years, which is the so-called illegal constructions in the country.

Base on the list in Table 4-2, the layout evolution of housing units in ISSC can be judged through certain indicators, including the layer numbers, and if there are certain life supporting facilities within the apartment, such as the kitchen, the bathroom and the hall.

As the table shows, the layer numbers of all the newly constructed residential buildings within the community in different years are following certain law. Similar to Case 1, the number increases year by year. But the law is more obvious than that of XNVC. To specify, residential buildings constructed in the 1950s were two or three stories high, three in the 1960s, then four in the 1970s, and finally five or six in the 1980s and 1990s. The increasing layer numbers indicates both the higher and higher construction technology and the continuous improvement of the sturdiness and durability of the buildings. And it is also a result of the increasing demand for living space from the growing number of employees and the expanding family structures.

Whether there is a private bathroom or individual kitchen in their own apartment is of great significance for people's living quality. It can be seen from the table that in the already demolished building No. 1, which was constructed as bachelor quarters in 1954, there was no kitchen at all and toilets were shared by the people living in the same floor. The situation can be fully understood because of the existence of a public bathhouse, and a kitchen and canteen in the community during that time. Then with time going by, the public bathhouse, kitchen and canteen were demolished about 1980s. While the single dormitories in XNVC were reinforced and extended to adapt to the change, the one in ISSC was demolished and a new six-story building was constructed on the site. But in another three buildings constructed at the same time, the standard is relatively higher. As can be seen in Table 4-2, in the three-story building No. 10, 11

and 12, there are individual kitchens and bathrooms, and even living rooms. The situation might be well explained by the fact the majority of the residents are cadres or senior intellectuals of the institutes and thus the living standard is relatively high. Also, similar to the XNVC, although the apartment was originally designed for one family, there might be two or even three families in an apartment and the living room might be used as a bedroom by them. As to the building No. 12, in 1963, one unit was added on the east side of the building with the same housing floor plans as the original building, aiming to accommodate more people. Then in 1993, there was another extension on the north side of the whole building. The extended space is used as an individual kitchen and bathroom while the original space of them is connected and used as a living room. And there is no doubt that only one family is using one apartment at that time, no more sharing with others.

There are three buildings that were constructed during the 1960s, and all the apartments have their own kitchen and bathroom, but not a hall. In the 1970s, the standard is a bit lower. It can be seen that in the two four-story building, the widen walkway is used as the kitchen, not an independent space. Also, two apartments are sharing one toilet. There is no hall space either. The building No. 19 was actually extended two years later after its completion. Similar to building No. 12, one new unit was added to the east side of the building. However, the new unit is adopting a different housing floor plan, in which each apartment owns its private bathroom and kitchen, no hall included either. Building constructions in the community reached its peak in the 1980s. All of the seven buildings were constructed with individual kitchens and bathrooms. And six of them own a hall or living room, except building No. 21. Then in the end of the 1990s, building No. 21 was extended on its north side. The added space is used as an individual kitchen, a bathroom and a small bedroom. The original kitchen is then used as a dining room and the

original bathroom and small bedroom are connected as one living room. In the 1990s, two six-story buildings were newly constructed, both of which are equipped with individual kitchen, bathroom and living room. [Table 4-2]

In summary, the overall living standard in ISSC has always been relatively high from the beginning when compared with the other two cases, which might be explained by the population composition. The majority of residents are cadres or senior intellectuals of the surrounding institutes of Chinese Academy of Sciences. But the overall evolution trajectory of the housing units in ISSC is similar to the other two cases. To specify, the layer number of the building have gradually increased from two in the 1950s to six in the 1990s. The kitchen and toilet were once shared by two or even more families, then individually owned by each household. As to the hall, at the beginning, there was no hall space at all, then the widened walkway can be used as a small hall, finally each household has its own independent living room. The overall process can thus be seen as a self-organizing process, in which residents' growing demand for more privacy and more living space, the management department's constructions and extensions, and other factors are all working together to maintain the healthy operation of the self-organizing system.

Table 4-2 The evolution of housing units in ISSC

	1950s		1960s		1970s		1980s			\$066I	
Layer No. Kitchen	*	35 Indi-	3F (Extrasies Indi- of one unit)	35 Indi	Widen 4F walkway as the kitchen	4F (Extensions) of one unit)	S.S. Indiv	oP/SP/4P Indi	6F Indis	3F (Extrasions Individual 1 on the north side)	6F Indi (Extensions (orig
tchen Bathroom	X Shared X by the same floor	Individual Individual	Individual Individual	Individual Individual	ten Shared kway by two hen families hen	ridual Individual	Individual Individual	Individual Individual	Individual Individual	ndividual	68 Individual Living Room (Extrasions (original Individual original or the
3	×	Living Room	Living Room	×	×	×	×	Living Room (abo used as the walkway)	Living Room (also used as the walkway)	Living Room & Hall (original coriginal state and käteken space)	Living Rosen (original
1954 #1_2F (Bothdor Quarter, demokshel)											
1954_#10,11_3F											
1954 #12 3F 1963 Extension 1993 Extension											
36,214,534										#1	
1964_816, 17_3F											
1976_V18_4F											
1976 #19_4F 1978 Extension											
1980_#21_6F 2000 Extension											
1989_023_6F											
1985_824_SF/4F											
1986_A'Doctor's House_5F											
me_SF 1987_#2,3_6F											
F 1989_#1_6F											
1996_N27_6F											
1999_A29_6F									H	0	

Among all the above-mentioned buildings, building No. 12, building No. 19 and building No. 21 are the only ones that have been reinforced or extended in later years. Building No. 12 is typical because it has gone through a longer evolution process, from 1954 to today. In the nearly 70 years of evolution, it has undergone two extensions, respectively in 1963 and 1993, thus it can better reflect living needs of people in different times and the management departments' effort to meet the needs. Building No. 19 was constructed in 1976 and expanded in 1978, the time span is relatively short. Besides, the expansion is to add a new unit on the east side of the original building, and the original building has basically not been affected. Thus, there is no further analysis on it in this study. At last, building No. 21 can be analyzed as a second typical case. It was constructed in the 1980s and extended in the end of the 1990s. It can reflect people's living need changes during that period and the extension is basically the last major constructions in the community. Also, the relevant records about its extension are quite clear in the archive. Most important of all, the later extensions of these two buildings can better reflect the spatial



Figure 4-45 The location of building No. 12

morphological evolution at the building level in the community, and thus help prove the existence of the self-organizing power within the community.

Constructed in 1954, building No. 12 is a three-story building that located in the southwest corner of the community. [Figure 4-45] It is 42.38 meters long and 8 meters wide. There are three units, and one staircase for two households, totaling 18

households in the building. But as mentioned earlier, there might be more than 18 families living in the building in early times because of a lack of living space. Also, the designed living room might be used as a bedroom due to the same reason. It can be seen from Figure 4-46 that the overall layout of the apartment is compact and efficient, in which the traffic space is quite limited. Once entering the apartment, one will immediately see four small doors leading to four different rooms, including one bathroom, one kitchen, one bedroom and one living room (might be used as a bedroom). In 1963, the first extension happened, in which one more unit was added to the west side of the building. Also, in Figure 4-46, it can be found that the newly added unit shared the same floor plans with the original three units.

In 1993, according to the record of archives, due to the fact that the building was originally constructed with the brick-wood structure in the 1950s, so was the added unit in 1963, it was determined that it needed to be strengthened after the appraisal of relevant departments and had been included in the seismic reinforcement plan of Chinese Academy of Sciences in 1991. There is a total of 24 housing units in the building, all of which had two rooms but without a hall. Besides, 16 of the 24 households were with the title of associate researcher or above. The living environment was particularly inconvenient and the call for improvements had continued over the years. In addition, the newly built residential building No. 1 was about to be completed at that time, and most of the residents living in the building No. 12 could move to the new building based on the distribution regulations. But if the building No. 12 could be slightly renovated, the vast majority of the residents could stay and resettle in the original place. Then the new building No. 1 could accommodate more researchers of the Institute, thus improve the overall housing efficiency of the Institute, which was a positive way to solve the housing problem when the housing investment was scarce at that time. Therefore, in 1993, the building

was reinforced and expanded by 3 meters on its north side. The added space for each apartment has been used as an individual kitchen and a private bathroom. And the space of the original kitchen and bathroom is combined and used as the living room. [Figure 4-46]

The traces of extensions from the past can be seen very clearly from the current pictures of the building. The most obvious characteristic is the different construction materials used in different periods. As can be judged from the first photo in Figure 4-47, the original building, including the extended one unit in 1963, was constructed with a red brick-wood structure while the extended section on the north side in 1993 was built with a brick-concrete structure, which is a more secure and solid form of structure. Today, the south façade of the building is exposed with red bricks and the north façade is covered with cement plaster. At last, the recessed jagged space on the north side of the building that was created by the extensions in 1993 is currently dealt with in different ways by residents themselves. The most common way is to enclose it into a confined space on the first floor and use it as their private space. [Figure 4-47]

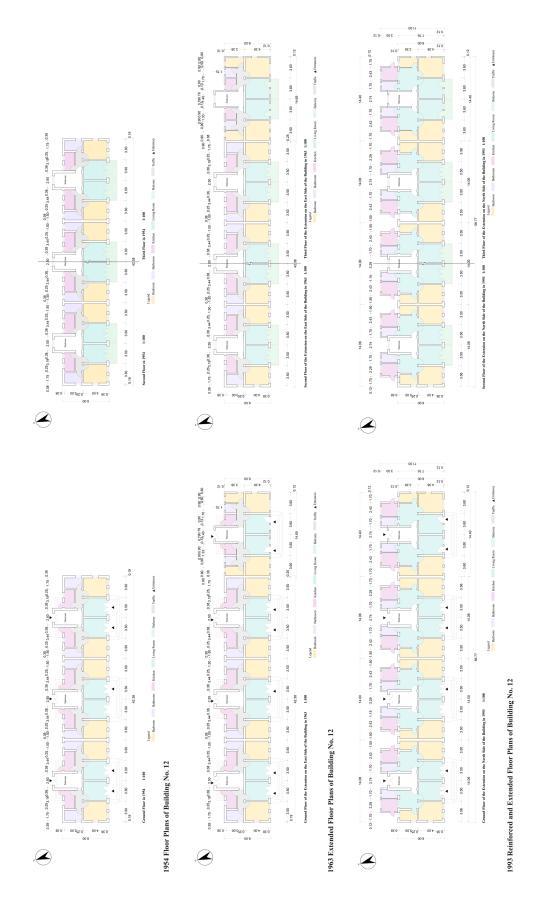


Figure 4-46 Redrawn floor plans of building No. 12





Extended unit in 1963 and expansions in 1993







South facade

North facade

Figure 4-47 Current situation of building No. 12

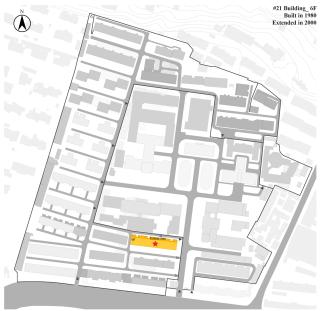


Figure 4-48 The location of building No. 21

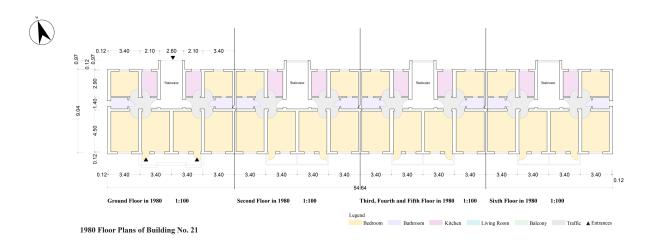
Building No. 21 is a six-story residential building that was constructed in 1980 with the brick-concrete structure. It is located on the south side of the community and surrounded by the working quarter to the north and east sides. [Figure 4-48] It was 54.64 meters long and 9.04 meters wide when constructed in 1980. Then in the late 1990s, it was expanded by 3 meters on the north side.

There are four units in the building, and one

staircase for two households, totaling 48 households in the building. Among those, 31 households are senior intellectuals. Similar to building No. 12, each apartment has two and a half bedrooms, but without a hall. Also, it can be seen from the redrawn floor plans of the building that the overall layout of the housing unit is also quite compact and efficient with the quite limited traffic space.

In 1998, the Institute of Soil Science proposed the self-financed expansion and transformation plan of building No. 21 to the Nanjing Branch of the Chinese Academy of Sciences. In the proposal, it is mentioned that despite of the continued housing constructions in the community, the housing issue of intellectuals has never been greatly improved, especially for those senior intellectuals living in building No. 21. Their living conditions did not even meet the lower limits of the control standards and thus they are strongly willing to contribute to improve the situation. In this context, the Institute decided to expand the building by three meters on the north side. The project started on December 1999 and ended on April 2000. The extended space

is used as a kitchen, a bathroom and a new half bedroom, while the original half room and the bathroom are combined together and used as a living room. Also, the original kitchen is connected to the new one and can be used as the dining room. [Figure 4-49] As the record described, the living conditions of the residents can be greatly improved after the transformation with less money.



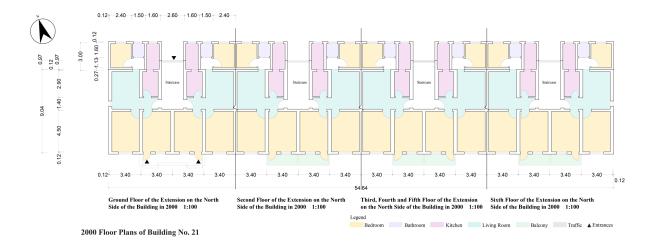


Figure 4-49 Redrawn floor plans of building No. 21

Unlike the building No. 12, it is hard to find traces of expansions from the outside appearance of the building. All the façades have been painted with the cement plaster. However, an elder resident told the author that, who has been living in the building since its completion and allowed the author to take some indoor pictures of her house, the original building was constructed with less solid materials and the expansions with more solid ones. As she described, if an earthquake happened, be sure to hide in the extended space, because it is much more solid. [Figure 4-50]





Current appearance of building No. 21

Entrance of the household that allowed to take indoor photos









Staircase

Expanded space in 2000 (From left to right are the half room, the bathroom and the kitchen)

Figure 4-50 Current situation of building No. 21

In summary, as for residential buildings in the community, only three of the seventeen buildings have ever been reinforced or extended officially under the leadership of the Institute and with the active participation of residents the over the past seventy years. And these major constructions within the community basically ended at the same time as the national housing

reform ended in the late 1990s. Thus, residential buildings as a whole do not change much over the past few decades, which may because that the Institute is a national institute, and the community is with cadres and intellectuals as the main residents. As a result, the standard of the construction was slightly higher than that of other types of work-unit communities at the same time, especially the enterprise work-unit communities, XNVC, for instance. However, in the process of its evolution, some spontaneous construction activities of residents are not excluded, including both the legal addition of elevators and the previous description of illegal extensions or constructions attached to original residential buildings. In the meanwhile, it has to be admitted that these residential buildings actually need "hardware" renovations, not just the "soft" renovations that are being carried out by BZ property management company mentioned earlier. As W described, the electric wires and various popes are exposed outdoors, which is dangerous and affects the overall appearance of the community. Also, some older buildings need to be reinforced or even extended. The building No. 14, No. 15 and No. 18 are located at the junction of the community and the city and are now being used as street-facing business, thus they have been renovated by the government in previous years to improve the overall image of the city, which however, was only limited to the exterior facade, not the interior. Just as them, the rest buildings within the community also need the financial and technical support of the government.

b. Public service buildings

There are generally some affiliated public service buildings within a work-unit community, such as the auditorium, infirmary, kitchen and canteen, bathhouse, hostel, workers' children school. After all, one work-unit is deemed as a small society during the work-unit period in the country. Unlike XNVC, in which there once were varieties of public service buildings, in ISSC, the kind of the public service buildings is quite limited. As Figure 4-51



Figure 4-51 Evolution of public service buildings in ISSC from the 1950s to the 2000s

shows, in the 1950s, there were only a kitchen, a canteen and a bathhouse on the north side of the community. But in fact, the three life supporting facilities can basically meet people's living needs. Other facilities, such as cultural, recreational and educational ones may not be considered for such a small community as ISSC. Then in the 1980s, the original canteen, kitchen and bathhouse were rebuilt on the original site. Along the west boundary of the community, a row of one- or two-story building were also constructed by the institutes. But only three of them have been used as public buildings by the institute and the rest as housing. To specify, a onestory store house and a two-story activity room of the Institute of Soil Science, a two-story office building of the Institute of Geography and Limnology. At last, a new three-story office building was built on the east side of the canteen. In the 2000s, the original canteen, kitchen and bathhouse were demolished, and a new six-story residential building was built on the site. Also, the three-story office building was replaced by a new four-story building. Nothing

changed about the three buildings on the west side. [Figure 4-51]

Overall, the number of public service buildings in ISSC have been relatively few from the beginning, and almost none left after the canteen, kitchen and bathhouse were demolished in the 2000s. But the disappearance of these buildings actually reflected the changing living needs of residents. Because there are already individual kitchens and bathrooms in their own house, the existence of the public one was superfluous.

2) Community level

The analysis of ISSC at the community level also consists of four key elements as the other two cases, namely, boundaries (including the enclosure form, the number of gates and the entrance space, and the street-facing buildings), the traffic organization, the architectural texture, and the public space (including the green space and the open space, such as the public square and the business street).

In this case, based on all the relevant data that the author collected, and in consideration of limited historical drawings, the site plans of ISSC in the 1950s, 1980s and 2000s are deemed as the most representative ones and are thus redraw and analyzed. The reason for not being specific to a certain year is because of the incompleteness of the historical drawings. Then, by superimposing and contrasting these three site plans, the spatial morphology changes that have happened at the community level in ISSC could be roughly judged. [Figure 4-52]

a. Boundaries

There are mainly two kinds of boundaries in the case of ISSC, including the external and internal ones. In terms of the spatial morphology, because of the close relationship between the community and the working quarter, the external boundary encloses both as a whole while the internal boundary is the further spatial division between the two, which is different from XNVC.



Figure 4-52 Redrawn site plans of ISSC in the 1950s, 1980s and 2000s

For the external boundary, it can be seen in Figure 4-52 that over the past seven decades, there has been few changes. The main changes include the partial expansion at the northwest corner of the community in the 1980s due to the newly built building No. 23, and the partial adduction at the southeast corner of the working quarter in the 2000s due to the subway construction of the city. As to the internal division between the community and the working quarter, because the construction of both the living quarter and the working quarter was incomplete at the beginning, boundaries between the two were not very clear, especially in the northeast corner. After 2000, with the end of the main construction activities in both areas, boundaries between the two has become more and more clear. As a whole, with the increasing number of residential buildings in the community, the internal boundary lines between the two are basically expanding to the working quarter. In the 1950s, the outer contour of the community was a narrow rectangle. Today, the

overall layout of the community is U-shaped, with the working quarter in between. Also, according to the obtained data, the external wall of the community has undergone an evolution from bamboo fences to solid walls, and partition between the community and the adjacent working quarter has evolved from the simple bamboo fences to the iron fences today.

In Figure 4-52, it can also be seen that the community has been always adjacent to a mountain on the north side, another residential district on the west side and the working quarter on the east side. Only the south side of the community is faced with a city road, thus there is only one main entrance on the south side of the community, from the 1950s to today. In the meanwhile, there have always been gates connecting the community and the working quarter along the internal boundaries between the two. Specifically, there was only one gate in the 1950s, but because the two were not completely separated at that time, the accessibility between the two regions was very strong. By the 1980s, with the construction of six residential buildings on the south side, the internal boundary of the two was extended to the working quarter. Three more gates have been added along the new boundary, but they were basically in an open state, thus the connections between the two were still strong. Today, the two basically achieve a comprehensive partition, as the Figure 4-52 shows, there are a total of 9 small doors between the two, 3 of which can be freely entered and existed. For the rest 6 doors, except for a main entrance of the working quarter that requires a swipe card to enter and exist, the rest 5 doors are usually locked. But it should be pointed out that both the in-service and retired employees of the institutes own the required cards.

As to the last element in the catalog of boundaries- the street-facing buildings, the situation is quite simple in the case of ISSC. As described earlier, surrounded by other districts on three sides, the community is faced with a city road only on the south side, along which

building No. 14, building No. 15 and building No. 18 are situated. Based on the collected data, building No. 14 was built in the 1950s, building No. 15 in 1963 and building No. 18 in 1976, all of which had always been used as residential buildings. Then around 1993, the Institute decided to demolish the existing bicycle shed along the street in front of building No. 15 (north side of the street), and then build 200 square meters of street-facing shops. As **X** said, in 2000, the city road was expanded and thus the shops were demolished. Instead, the ground floor of the existing three residential buildings began to open doors to the city road, becoming the new street-facing shops. Then in 2017, these three buildings are renovated by the government to improve the overall appearance of the city.

b. Traffic organization

Overall, during past few decades, the road network in ISSC has always been relatively simple and efficient. With the main road facing the entrance on the south side of the community as the center, branch roads extending from the main road on both sides would continue to extend with the expansion of the community, thus ensure the accessibility of each building.

c. Architectural texture

Similar to other old work-unit communities, in the 1950s, there were relatively few buildings within the community. And it can be seen from the site plan of the 1950s that all the buildings in the early days were two or three stories high. Thus, the floor area ratio (FAR) and density of the community were relatively low. Also, the community was then surrounded by a large area of water. In the 1980s, three two-story old buildings on the northwest corner of the community were demolished and replaced by six six-story new residential buildings. And another two five-story buildings were newly built on the right. On the south section of the community, three three-story, two four-story and one six-story buildings were also constructed in

the area that originally belonged to the working quarter. In the meanwhile, with the improvement of the drainage system in the community, the original water bodies used as drainage ditches were landfilled. Along the west boundaries, on the original site of those drainage ditches, a row of one- or two-story buildings had been built. They seemed to be illegal buildings, but in fact they were specially built by the institutes to accommodate those employees without sufficient living space. Obviously, the FAR of ISSC was much higher in the 1980s than the 1950s. Then in the end of the 1990s, the major construction activities in the community basically ended with the official end of the national housing reform in the country. In the site plan of the 2000s, it can be seen that the original canteen, kitchen and bathhouse on the north have been demolished and replaced with a new six-story residential building. Also, two five-story building and one fourstory building were newly built on the right. In addition to these, there were no other newly constructed buildings in the community. But there have been partial extensions and constructions every now and then, including both the legal ones constructed by the institute and the illegal ones built by residents. As a result, the FAR of ISSC is higher than the 1990s, but not so high, especially when compared with other old work-unit communities.

d. Public space

The public space mentioned in this research mainly includes the green space and the open space (the public square and the business street). Similar to the other two cases, because the drawings obtained from the archive are mostly building-related, the depiction of the public space is relatively vague and missing. Fortunately, according to the figure-ground relationship, it can be said that the change of the public space is inversely related to the building density in the community. That is to say, as the density of buildings increases in ISSC from the 1950s to today, the size of the public space naturally would shrink.

In the section of the administrative evolution, the open space and green space in ISSC have been introduced briefly as proofs of the poorly management situation of the community from 2015 to July 2020. Photos used in that section were all taken in the summer of 2019. In this section, photos used were all taken in September/October 2020, after the settling in of BZ property management company. [Figure 4-53] Thus, the analysis of the public space here is closer to the status quo of the community, reflecting the current situation of its public space. In the meanwhile, by comparing them with the photos took in 2019, changes happened could be noticed intuitively.

Based on the information obtained from the field investigation, there are mainly seven obvious public space in the community today, as shown in Figure 4-53. It can be seen that place A is a large triangle open space, separated into two parts by a hard pavement. Among the hierarchical vegetation, there are parked vehicles and other temporary structures. It is obvious that certain vegetation, especially the tall trees, has been trimmed and is in better condition than before. But the overall condition of place A is still relatively messy.

Place B is a green land with clear boundaries and rich vegetation, which basically remains untouched after BZ property management company settled in. Place C is currently used as a parking lot, in which there are two different paving materials. Half of it is the grass brick and the other half is pebbles. Compared with previous photos, the pebble section was originally equipped with some fitness equipment but was being removed when the author went there in the summer of 2019. The reason is that basically no one would use the facilities and they were dilapidated. Both place D and E are open space that are being used as parking lots and there is basically no change except for the added parking lines on the ground compared with before. Place F refers to the open space between the gables of the six buildings that were built during the

Republic of China period, which is a larger area. But it is now being used as a single row parking space and the use of space is inefficient. Except for the partially trimmed big trees, the changes are not obvious either.



Figure 4-53 Public space analysis of ISSC (photos taken in September 2020)

As to the last kind of open space in ISSC- the business street, unlike the inner one of XNVC, the business street in ISSC is open to the urban main road. And its evolution trajectory has been described in detail in the section of "boundary", so no more details here.

In summary, from the 1950s to 2000s, the boundary adjustments of the community over the years were mainly due to the newly constructed buildings in the community, and it mainly has been expanded to the adjacent working quarter on the right. In the meanwhile, the main changes of boundaries at the junction with the city on the south side was that the three buildings along the street began to open doors to the outside in the late 1990s, forming the street-facing commercials. The appearance of the street-facing commercials can be seen as the embodiment of the gradual openness of the community. Similar to boundaries, the road network in the community has been gradually extended with the new buildings, which has been relatively clear and fixed. Also, the spatial layout of the community has been becoming more and more crowded with time going by. And before the late 1990s, most of the constructions in the community were led by the Institute and after that, it has been the residents who are constructing or renovating the existed buildings. As to the public space in ISSC, including the number, scale, quality and the efficiency in the use of the space are all not very satisfying in ISSC. And there is a serious lack of public square where people can gather together, communicate or take exercise.

Overall, the evolution of all these four elements at the community level, including boundaries, the traffic organization, the architectural texture and the public space, can be seen as concrete manifestations of the self-organizing process in the community. As mentioned in the section of the administrative evolution, before the official end of the national housing reform in late 1990s, the major construction activities in the community and its management and operation were mostly responsibilities of specific departments of the Institute. In the meanwhile, constructions and renovations in the community were generally started under the appeal and cooperation of residents, so as to meet their increasing demand for living space. Also, boundaries, the traffic organization and the architectural layout of the community have been expanding or changing together with these activities. Then ever since 2010, new factors began to involve in, including the property management company, the street office, the residents'

committee, the temporary management committee and the expected official homeowners' committee. And based on the analysis in the section of administrative evolution, in fact all of these parties could be treated as an "insider" or non-specific interference from the outside. Together with the former inside factors, they have been working together to promote the evolution of the community. In a word, without "specific interference from the outside", all kinds of active factors in the self-organizing system (the community), such as the Institute, residents, buildings, road networks, have been interacting and cooperating with each other, which promotes the continuous improvement of the living environment of the community.

3) City level

As described in XNVC, the spatial morphological evolution at the city level can be treated as "non-specific interferences" from the outside because of certain reasons. Due to the overall planning and development of the city, plots, road networks and the public space surrounding the community may change accordingly. However, the purpose of these changes is to serve the development of the entire city, but it may have a radiation effect on the development of the community. In this case, the spatial morphology around the community in the 1950s, 1980s and 2000s were redrawn based on the collected data. [Figure 4-54]



Figure 4-54 The spatial morphological evolution around ISSC from the 1950s to the 2000s

As can be seen from Figure 4-54, the surrounding plots of ISSC during the past 70 years haven't changed too much. Specifically, the community is adjacent to Jiuhua Mountain on the north side, which owns a long history and a park named after the mountain was constructed there in 1978. There is another residential area on the west side of the community and similar to ISSC, its building density has gradually increased in the past few decades. On the east side is the working quarter of the Institute, in which buildings have also been increasing during the past years. By 2020, the working quarter is still there. But according to the collected data, it is about to be relocated to a new site within a year or two because of the lack of space of the current site. Undoubtedly, the reuse of the area will have a huge impact on ISSC. Finally, the community is close to a main urban road- Beijing East Road on the south side.

As to the development of the surrounding road network, based on the previous description of surrounding plots, it is not difficult to find

that the community has always been in a state of being enclosed on three sides during the past few decades. Only its south side is close to a city road, thus only changes of this road will directly affect the community. In fact, the road was expanded to its current state around 2000. In addition to the demolition of the original row of shops on the south side of the community, the most obvious impact of the road expansion on the community should be the commercialization of the three residential buildings along the street. The first floor of the three buildings began to open to the road, forming a commercial belt. This commercial street is a window opened to the city by the community, and it is also an attempt to merge into the surrounding city made by the community that has been enclosed on three sides.

Last but not least, the development of the surrounding public space within a certain distance from the community has been also affecting the evolution of the community indirectly, including the newly appeared public service facilities, such as the commercial, educational, medical, sports and cultural facilities, and the newly emerging open space, such as the public square, parks, green space and business streets. Also, the newly added bus or subway lines can affect residents' modes of travel and lifestyle. All of these factors are driving residents of ISSC to walk out of the community to enjoy various public facilities in the city, which is another reason why the community is becoming more and more open to the outside.

Like XNVC, the current distribution of different city-level factors surrounding the community within a scope of 1,200 meters (15 minutes by walking) and 800 meters (10 minutes by walking), including the surrounding road network, public service facilities and open space, will be drawn and illustrated, so as to prove the maturity of the surrounding city and its attractiveness to the community.

It can be seen from Figure 4-55 that within the two radius scopes, there are quite a lot subway and bus lines and stations, making the residents' daily trips very convenient. Also, as mentioned in the introduction section, there are many educational facilities surrounding the community, from kindergarten to university, among which there are certain famous ones. This is actually one of the key reasons why people would buy houses in the community. Last but not lease, the Xuanwu Lake, Jiuhua Mountain and Zijin Mountain on the northeast side of the community are improving the land value of ISSC significantly. In a word, all these mature public spaces nearby have been attracting residents in ISSC to merge and enjoy the city, instead of enclosing themselves in the community as before.

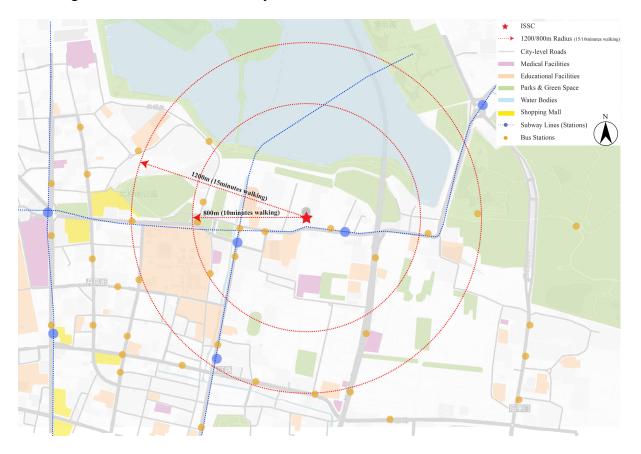


Figure 4-55 City-level surrounding road network and public space of ISSC¹⁰

¹⁰ "Nanjing Institute of Soil Science Community _ Details of Institute of Soil Science | Second-Hand Housing | Rental Housing | Community Consultant (Nanjing Lianjia)." Accessed April 17, 2020. https://nj.lianjia.com/xiaoqu/1411000000660/.

4.2.2 Conclusions

Like XNVC, the official end of the national housing reform in the late 1990s is one of the important turning points of ISSC. But unlike XNVC, the working quarter of ISSC is still there, despite of the fact that it might be moved away within one or two years. In the meanwhile, the three times of transfer of the property management responsibility of ISSC- in 2010, 2015, and 2020 respectively, are three other important turning points in the evolution of ISSC. The following conclusions about ISSC can be drawn from the above analysis of the administrative and morphological evolution of ISSC in the past decades.

1) The overall administrative evolution of ISSC is a process from simple to complex. Like XNVC, before the end of the national housing reform in the late 1990s, the Institute (workunit) had been the main role players in the management of ISSC. Then its strength of power has been becoming weaker. Correspondingly, ever since 2010, different role players began to involve in, which in fact has been an exploration and experimental phase. To specify, a nonprofessional property management company moved in in 2010, followed by the street office in 2015, until another professional property management company settled in in August 2020. And, the management of the first two of these three were both quite disappointing while the last company is given high expectations. After the end of the six-month trial period of the company, an official homeowners' committee is expected to be established by residents themselves, which is similar to the homeowners' self-governing management committee in XNVC. At that time, residents will participate in the management of their own community with the cooperation of the property management company. As for the morphological evolution of ISSC, the overall trajectory is similar to XNVC. To specify, the social morphology tends to evolve from single to complex, including the increasing complexity of residents and a mixture of property rights within the community. And the evolution of the spatial morphology of ISSC is also a process from diversity to singleness as XNVC.

- 2) Judging from the physical performance of ISSC (as of July 2020), the power of self-organizing in the community is relatively weak when compared with XNVC. By comparing the administrative evolution of the two communities, it can be inferred that an important reason lies in the residents' enthusiasm and autonomous management. Taking residents as the main body of management and other departments or institutions as the auxiliary may be the key to make the work-unit community have stronger self-organizing power. And the reason why residents in ISSC are less cohesive and active than XNVC is that, on the one hand, residents in ISSC belong to different work-units from the very beginning; on the other hand, the large population flow in ISSC caused by the school district housing (SDH) in the community has led to the much more complex population structure in it.
- 3) While admitting the weakness of the self-organizing power in ISSC, one important physical manifestation of its inner self-organizing power has to be mentioned. That is, the ongoing elevator addition project in the community. The addition of elevators in the community is an autonomous and spontaneous act of residents at the initiative of the government, which is mainly implemented through the cooperation of residents and the elevator company. Here, the pursuit of the convenience of going up and down stairs of residents who are living in upper floors is driving the elevator to be added to buildings. In other words, the non-equilibrium between the lag of functions and the change of residents' demand acts as the main power resource for the continuous evolution of the community. This also confirms the fact that the self-organizing force in the community, though weak, is not absent.

- the main driving factors in ISSC is a bit different from XNVC. As XNVC, the urban development around ISSC is also becoming more and more mature, and the accompanying construction and improvement of various supporting urban facilities are attracting residents of the community to go out and merge into the city. But unlike XNVC, there is basically no public service facilities or businesses in ISSC that can attract outsiders into the community. Instead, the main factor that ISSC is attracting people from the outside is its excellent geographical location in the school district. Many parents would buy houses in the community only to let their children study in the nearby good schools. This not only leads to the gradual complication of the community population, but also promotes the community's opening to the outside world to a large extent.
- property management company (BZ) that settled in the community under the initiative of the residents' committee in August 2020 is undoubtedly a promising and practical action. This company is a professional one in the modern sense, which is basically responsible for the maintenance, renovation and upgrading of all the public space in the community. However, it must be pointed out that there are still certain jobs that the professional property management company cannot do for the work-unit community that with a long history. For instance, the maintenance of residential buildings, the standardization of illegal constructions and the lack of public space in the community. At present, these "huge" reconstruction projects can only rely on the financial and technical support from the government. In addition, it worth mentioning that while the greening in ISSC is abundant, there is a serious lack of the public space in the community, in which residents can communicate and relax.

6) For those work-unit communities as ISSC that cannot establish the homeowners' committee in a short time, the ongoing transformation route in this case is worthy of reference. To specify, there are mainly three steps in the route. First, under the guidance of the residents' committee, a temporary property management committee can be formed to sign the Property Service Contract with a professional property management company. Then the handover of "One Management" can be operated as a trial operation without adding additional burden to residents. Finally, when the performance of the company can really benefit the community and residents, the collection of a higher property management fee and the establishment of a formal homeowners' committee can be considered. If this model can be carried out smoothly, it is very likely that residents' committee can basically get out and hand over the responsibility of community management to homeowners and the property management company, thus achieve the successful handover of "One Management".

4.3 Case 3: No. 1 Xiaomenkou Community (#1XC), the Living Quarter of No. 3503 Factory

No. 1 Xiaomenkou Community (#1XC) is a military enterprise community that was constructed in 1954. According to an authoritative website (*Lianjia*) for selling houses in the country, in #1XC, there are about 1576 housing units, the housing price is 32,896 CNY/m² and the maintenance fee is about 0.5 CNY/m²/month.¹¹

The full name of the enterprise that #1XC belonged to was No. 3503 Factory of the People's Liberation Army, which was originally a logistic work-unit of the army and was mainly responsible for the production of military uniforms. According to the Central Military Commission's decision on the handover of military support enterprises to the local

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¹¹ "Nanjing No. 1, Xiaomenkou Community _ Details of No. 1 Xiaomenkou | Second-Hand Housing | Rental Housing | Community Consultant (Nanjing Lianjia)." Accessed April 24, 2020. https://nj.lianjia.com/xiaoqu/1411046917317/.

administration, in 2001, the factory was placed under the management of Xinxing Casting Pipe Group Co., Ltd., and the name was changed to Nanjing 3503 Garment General Factory. In 2003, the working quarter of the factory moved to a new site that is about 9 kilometers away from #1XC. In 2010, after restructuring, the production related departments of the enterprise were renamed Nanjing Jihua No. 3503 Garments Co., Ltd (J3503). The reorganized company is now making different kinds of uniforms, not limited to military ones any more. In the meanwhile, the original logistic department of the enterprise was separated, and the new office is about 1.6 kilometers away from the community, forming an independent company. This new company, which called Nanjing No. 3503 Investment and Development Co., Ltd (N3503), has been responsible for the historical legacy of the enterprise after the reorganization in 2010, such as the management and redevelopment of the original site, mainly the working quarter, the daily maintenance and management of the old living quarter, and the welfare of certain retirees. However, it must be clarified that although J3503 and N3503 have been separated since 2010, both companies are subsidiaries of Xinxing Jihua Group Co., Ltd, which is a central enterprise that is under the direct leadership of the State-owned Assets Supervision and Administration Commission of the State Council (SASAC). Based on the collected data, it is found that 2010 is an important time node in the evolution of #1XC. For convenience, in this research, the author will use the Factory to refer to the work-unit before 2010, including No. 3503 Factory of the People's Liberation Army before 2001 and Nanjing 3503 Garment General Factory after. After 2010, N3503 is used to refer to the new responsible company in the management of #1XC and J3503 refers to the new production-related company. In the meanwhile, both the Factory and N3503 can be called the work-unit or the original work-unit.

When compared with the other two case work-unit communities, it is worth noting that in #1XC, there is such an independent company that stays behind to deal with the remaining legacy of the work-unit after the working quarter moved away, which seems to be a more conducive way to manage and redevelop the community. And indeed, because there is such a dedicated company that is in charge, the development and changes happened within #1XC is much more visible, or more violent and direct, than the previous two cases. In fact, the most impressive aspect about the community is its fragmented situation. Judging from its current overall layout, this community is composed of at least ten or so fragments. The most intuitive manifestations include various physical separations such as walls and fences, the open space that is under construction or abandoned, and the new and old residential buildings that are in sharp contrast. [Figure 4-56]



Figure 4-56 Fragmented situation of #IXC (photos taken in 2019/2020)

In fact, after the official end of the national housing reform in the late 1990s, there were basically no large-scale new constructions in the other two case work-unit communities, at most partial additions or renovations. But in #1XC, the situation is quite different. Starting from the end of the 1990s, the community has experienced several major demolitions and new constructions under the leadership of different role players, such as the Factory, N3503, the

private developer or the cooperation of them. In summary, as to the construction of residential buildings, there have been four phases of projects ever since the late 1990s. The first three phases are all fund-raising housing projects developed by the work-unit in 2000, 2004, 2010 respectively. The last one is also a fund-raising housing project in principle. But it was originally built to relocate those households in the community who had lost their houses due to the work-unit-led real estate development, while the first three projects were mainly built to improve the quality of employees' living space. Also, the last one was developed by the cooperation of N3503 and a private developer (YT), which was just completed at the end of 2019.

Fund-raising housing is a kind of work-unit welfare that is initiated, constructed and managed by the work-unit itself, and has been basically decoupled from the state power and the state welfare. In the process of transformation in the country, the welfare system of the work-unit has shrunk significantly, and the fund-raising house can be said to be the most important one among the new types of welfare of the work-unit. The work-unit would seek unused land in the community or obtains the land by demolishing some original buildings for the construction of the fund-raising housing. Employees in the work-unit are ranked according to their length of services, whether the husband and wife are dual employees of the work-unit, etc., so as to determine who are qualified to purchase the fund-raising housing and the priority of the selection of the fund-raising housing. Those qualified employees must hand over their existing houses to the work-unit, which can be converted into a part of the purchase price, and pay the remaining difference in the purchase price at a price lower than the market price of the commercial housing

in the same area.¹² But it should be pointed out that targets of the fund-raising housing must be limited to low-income families that are with housing difficulties.¹³

The fund-raising housing aims to change the welfare system of housing construction and distribution by the state and the work-unit. Instead, the government, the work-unit and individual employees would jointly undertake the construction of the house by raising funds. Individual workers can enjoy partial reductions or exemptions in terms of credit, building material supply, taxes and other fees. The ownership of houses built through fund raising is determined according to the proportion of the capital contribution. An individual who contributes 100% of the housing price owns all property rights, and an individual who partially contributes has some property rights. And in #1XC, basically all households in these three phases of fund-raising housing projects have chosen to own 100% property rights of their houses.

Also, it should be clarified that the original resource of the fund-raising housing- the land that the work-unit has the right to use, comes from the state's free distribution under the planned economic system during the work-unit era, thus can be counted as a return of the surplus capital of the state. And the operation mode of this new type of welfare is to use land as an ordinary means of living and to build houses based on practicability, instead of the commercial housing development. Therefore, the construction of the fund-raising housing is fundamentally different from that of the work-unit entering the land market and even the field of real estate development to conduct operational activities, because the land used for the construction of fund-raising housing has not been capitalized to enter the new capital accumulation system of the country.

¹² "A Study on the Institutional and Spatial Transition of Danwei Community in China Take Nanjing 3503 Factory Community as an Example." Accessed November 18, 2020. http://d.wanfangdata.com.cn/thesis/W2033808.

¹³ "Ministry of Housing and Urban-Rural Development of P.R. C - Notice of Ministry of Construction, Development and Reform Commission, Ministry of Supervision, Ministry of Finance, Ministry of Land and Resources, People's Bank of China, General Administration of Taxation on Issuing the *Measures for the Administration of Affordable Housing*." Accessed November 20, 2020. http://www.mohurd.gov.cn/wjfb/200712/t20071201 157795.html.

Undoubtedly, the land is one of core resources in the new national accumulation system in the country, and resources are limited. Thus, the construction of the fund-raising housing has a de facto impact on the new national accumulation system, during which part of the land does not enter the national accumulation system and stays out of the system. As a result, many local governments have shown a rejection and even clear opposition to the construction of fund-raising housing.¹⁴

Before detailing the four phases of housing projects constructed in #1XC since the end of the 1990s, those old buildings left over from the history in the community deserve a brief introduction first. As of 2020, there are about fifteen old buildings in the community. To specify, the three-story building No. 29 and No. 30 were built in 1954, making them the oldest buildings in the community. Although they were built by following the same set of construction drawings, building No. 30 was initially used as a single dormitory while building No. 29, like other residential buildings in the community, was allocated to employees with families and underwent an expansion around 1994. The four-story building No. 35 (demolished in recent years) and No. 36 were constructed in 1976. In terms of the spatial layout, these four buildings can be regarded as a small group. The five-story building No. 38 and six-story building No. 39 were completed around 1980, neither of which has a clear concept of grouping. The six-story building No. 41 and No. 42 were constructed during 1986 to 1988 and can be treated as another small group. At last, there is a relatively regular large building group at the southern end of the community. There are totally eight buildings within the group. Except that the four-story building No. 37 was built at the same time with the building No. 35 and No. 36, which makes its appearance old and shabby, and the seven-story building No. 40 in 1982, the other six buildings were all constructed during

¹⁴ "A Study on the Institutional and Spatial Transition of Danwei Community in China Take Nanjing 3503 Factory Community as an Example." Accessed November 18, 2020. http://d.wanfangdata.com.cn/thesis/W2033808.

1990 to 1995, including the six-story building No. 43, building No. 44 and building No. 47 and the seven-story building No. 45, building No. 46 and building No. 6.

These old buildings are only those that have survived. In fact, since the late 1990s, along with the intermittent new constructions, many old buildings in the community have been demolished and replaced by new ones. As mentioned earlier, from the perspective of the architectural layout, these intermittent new residential constructions mainly include three fundraising housing projects, one resettlement project. Among them, except that phase III project is located on the original working quarter, the remaining three housing projects are all constructed within the original living quarter area. [Figure 4-56]

To specify, phase I residential building project was constructed through the form of fundraising housing after demolishing certain old buildings on the original site around the end of the
1990s, with the Factory as the developer. There is a total of five six-story buildings (building No.
51 to building No. 55) with a large vegetable market on the basement level in the project, which
is why the five residential buildings are all built on a platform. The completed dwellings were
allocated to those households whose houses had been demolished because of this project and
other qualified employees. Currently, due to the earlier construction year and the absence of a
professional property management company, buildings in this group are relatively dilapidated
and the maintenance of the environment is slightly poor.

Similar to phase I, phase II was also constructed by the Factory on a piece of land in the living quarter after demolishing several old buildings between 2001 and 2004. There are only three six-story buildings (building No. 56 to No. 58) in this project. And phase II is also a fundraising housing project. Housing constructed in this phase was mainly distributed to long-serving employees whose living space is not enough. There is no professional property management

company in this group either, thus the living environment is not so good. But due to the late construction year, the quality and appearance of these buildings is better than those in phase I.

Phase III was also constructed by the Factory between 2007 and 2010 and is also a fundraising housing project that aimed for the factory's qualified employees. There are totally two six-story residential buildings (building No. 17 and building No. 18), three seventeen-story highrise residential buildings (building No. 19, building No. 21 and building No. 22), and one threestory commercial buildings (building No. 20). Different from the former two phases, this project is constructed on a piece of land in the original working quarter, instead of the living quarter. Also, it is strictly walled and gated and a professional property management company (NK) has been hired by N3503 to manage it, making it an independent community from the old district of #1XC. Naturally, the living environment of phase III is much better than the former two phases. As mentioned earlier, the Factory was reorganized in 2010 and the production-related departments were renamed J3503. The management of the vacant working quarter as well as the original living quarter is left within the hand of the reorganized company N3503, which mainly consists of the original logistic department of the Factory. Since the original logistic department of the Factory was mainly responsible for the building construction in the work-unit, although the project was completed around 2010 when the Factory was undergoing restructuring and reorganization, its transition in construction and management was not so complicated. And it should be clarified that employees of both reorganized enterprises can enjoy the fund-raising housing constructed in phase III.

When the author did the field investigation in the summer of 2019, phase IV was still under construction, but main buildings have been completed. There is one six-story building and one sixteen-story, partially eighteen-story and partially twenty-story building in the project.

Phase IV is developed by the cooperation of N3503 and the private developer YT and was built on the vacant land where the original six two-story buildings were demolished in the south of the living quarter. The houses are to accommodate households who have lost their houses due to the construction of phase IV project, the nearby commercial housing project (Ruyuan) in the living quarter and the suspended second-phase project in the land of the original working quarter. These households can acquire new houses in a certain proportion to the size of their original houses. As a matter of fact, the project should have been completed and handed over at the end of 2017, but it was delayed for certain reasons. And this delay also caused some lawsuits among the aimed households, N3503 and YT, most of which are arguments on the demolition and resettlement fees caused by the delay of the project. During the field investigation in 2020, when it comes to phase IV project, the most common sentence said by residents is that "they (target households of the project) have been living outside for 8 years and have not yet returned", and the sentence is full of sympathy and disappointment. Last but not least, although the project has not yet been put into use, peripheral walls have been initially formed. It is foreseeable that this area will become another enclosed district within #1XC as phase III.

Obviously, the above-mentioned four residential projects are mainly developed and constructed by the work-unit, either the Factory or N3503 or the cooperation of N3503 and YT. And all of them aim to benefit employees of the work-unit. The occupied land still belongs to the work-unit. However, entering from the main entrance on the north side of the community, one would see a special group of buildings located on the front right. The modern architectural style, the clean and textured exterior skin and the marble walls around this building group are all making it particularly conspicuous in the surrounding old residential buildings. It is actually a commercial housing project (RY) developed and constructed during 2016 to 2019 by YT who

has purchased the land use right from N3503, and the target sale group are home buyers outside the work-unit. There are totally four nine-story and two seven-story residential buildings in the project. A professional property management company (YC) is running the community and the living environment within it is the best among all the residential building groups in #1XC. To a certain extent, this commercial housing project is similar to phase III project, such as the employment of a professional property management company, the individual entrance control and security guards, as well as the peripheral walls or fences. All of these factors are making the fragmentation of #1XC more obvious.

Apart from these residential buildings, among which only the phase III project is located in the original working quarter while the rest are all located in the living quarter, there is also a first-phase completed commercial complex (H1) project that is completely located in the original working quarter, and a second-phase (H2) project that is mostly located in the original working quarter and occupies a small part of the original living quarter. The H1 project is a commercial complex project developed by YT and consists of two buildings. Building #1 is high-standard office building with 25 floors and a height of about 100 meters. Building #2 has a total of 13 floors and is about 69 meters high. Among them, 1-4 floors are commercial podiums and 5-13 floors are multi-functional commercial residences with 5 meters high. The H2 project is planned as a commercial office land and should be developed jointly by N3503 and YT. But due to certain legal issues between the two parties, the project has been suspended for many years. As of 2020, most of H2 project's land has become wasteland, and only a small portion is being used as a fee-charging parking lot.

Compared with the other two case work-unit communities, it is noticeable that in #1XC, the analysis of the redevelopment of the original working quarter is also involved, which,

however, will not be analyzed in depth. The main reason is that the development of the living quarter and the working quarter is closely related in this case. For instance, phase III residential project was constructed on one plot of the original working quarter after demolishing certain production-related buildings. The H2 project led to the demolition of several residential buildings in the original living quarter. Also, the phase IV project accommodates households who have lost their homes because of the H2 project. By tracing to the source, the fundamental reason of the interlaced relationship between the living quarter and the working quarter is that one management department/company is in charge of the operation and development of the two, that is, the logistic department of the Factory before 2010 and N3503 after.

Last but not least, there is a natural hill in the center of the community- Miao'er Mountain, which is about 35 meters high. With lots of trees on the mountain and a quiet environment, it is really a good place for walking and relaxing. In the meanwhile, however, the hill can be seen as another large fragment in #1XC. And it's really a pity that a community that could have been tightly held together around this beautiful natural garden is now becoming more and more fragmented, and the atmosphere of the community is gradually dissolving.

In a word, #1XC has become one of typical cases in this research due to its unique fragmentation process. Through comparative analysis with the other two case work-unit communities, on the basis of following its original evolution trajectories, this study hopes to provide certain effective and practical retrofitting strategies for the community, which actually mainly refers to the old residential areas on the west and south side of the community.

4.3.1 Analysis process

Similar to the former two case work-unit communities, the evolution analysis of #1XC will be carried out from two aspects: the administrative evolution and the morphological evolution. Relevant data collection heavily relies on questionnaires and archives.

4.3.1.1 Administrative evolution

1. Research scope

Before further analyzing the administrative evolution of #1XC, it is necessary to define the scope of research first. On the whole, similar to the other two case work-unit communities, #1XC or the living quarter of the Factory was also mainly managed by certain departments of the work-unit before the national housing reform officially ended in the late 1990s. Then since around 2000, with the work-unit gradually withdrawing, different parties began to participate in the management of the community, such as the Institute of Environmental Health Management, the residents' committee and the property management company. In the meanwhile, different construction projects have been constantly emerging within the community, even after the official end of the national housing reform. As described earlier, as to the construction of residential buildings, there have been a total of four phases of fund-raising housing projects (Phase I, II, III, and IV) and one commercial housing project (RY) ever since the late 1990s in the community. Among them, only phase III (2010) project is constructed on a piece of land of the original working quarter after demolishing certain production-related buildings. Also, it is strictly walled and gated and a professional property management company (NK) has been hired by N3503 to manage it, making it an independent district from the rest area of #1XC. Thus, the administrative mode of the phase III housing project is not within the research scope in the administrative evolution of #1XC, although this district is called building No. 17-22 of #1XC.

On the other hand, similar to phase III, phase IV (2019) project and the commercial housing project RY (2016) located in the center of the community can both be regarded as small enclosed residential districts within #1XC. Despite of the fact that they are both located in the original living quarter, they have been equipped with individual professional property management company from the beginning. Therefore, the study on the administrative mode of these two projects is of little significance in the administrative evolution analysis of #1XC.

In a word, the research scope in this section was relatively clear before 2016, when the commercial housing project was completed, that is, the original living quarter of the Factory or #1XC. Then with the demolition of many buildings in the original living quarter and the completion of the commercial housing project (2016) and the phase IV project (2019), the research scope has become smaller. As of 2020, as to the administrative evolution analysis of #1XC, the area with a real historical research value only includes the fifteen existing old building built intermittently during the 40 years from 1954 to 1995, the phase I and phase II fund-raising housing projects completed in 2000 and 2004 respectively. These areas are collectively referred to as the Old Community in this study, which are distinguished from the later three newly-built, enclosed and gated districts. [Figure 4-57]

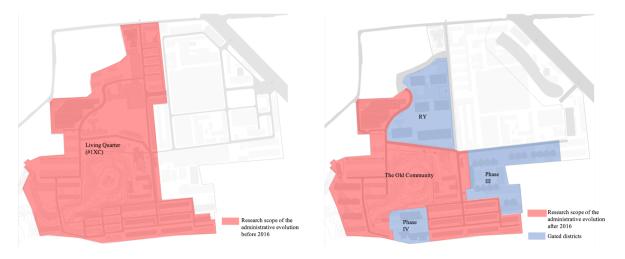


Figure 4-57 Research Scope of the administrative evolution of #1XC

The Old Community has existed for nearly seven decades and has witnessed the entire historical evolution of #1XC. Thus, the analysis on its administrative evolution over the past decades is more in line with the purpose of this research and may better prove the existence and the strength of the self-organizing power within #1XC. Today, the Old Community is basically in an open state, and no professional property management company has settled in yet.

2. Data collection

The acquisition of the historical data of #1XC, especially at the administrative level, is much more difficult than the previous two cases. And this is mainly caused by the particularity of the work-unit that the community belongs to. As mentioned earlier, the work-unit was previously called No. 3503 Factory of the People's Liberation Army, which was a large-scale military enterprise designated by the state and the military for dyeing, bedding, and clothing. Then after two times of restructuring and renaming in 2001 and 2010 respectively, today the production-related section of the work-unit is called Nanjing Jihua No. 3503 Garments Co., Ltd (J3503), specializing in the research, development and production of various kinds of clothing and hats, such as the quartermaster clothing, business wear, casual wear and big brimmed hats. Although the reorganized company is now making different kinds of clothing, not limited to military uniforms any more, it can be judged that the work-unit has always been classified as a military factory, a type of enterprise that may involve confidential information of the country. Therefore, the author cannot gain access to the archive located in J3503 due to the confidentiality of the military factory and other irresistible factors.

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¹⁵ "Introduction of No. 3503 Factory of the People's Liberation Army." *Jiangsu Statistics*, no. 12 (1997): 32.

¹⁶ "Introduction of Enterprise_ Nanjing Jihua No. 3503 Garments Co., Ltd." Accessed November 21, 2020. http://www.3503.com/intro/1.html.

Fortunately, the study on this case can finally be carried out based on the data collected through other means. First, as described earlier, after the reorganization of the work-unit in 2010, the original logistic department of the enterprise was separated from the production-related sections, forming an independent company- Nanjing No. 3503 Investment and Development Co., Ltd (N3503). N3503 has been responsible for the historical legacy of the enterprise after the separation, including the management and redevelopment of the original site, the daily maintenance and management of the old living quarter, and the welfare of certain retirees. Obviously, the research scope in this section- the Old Community, is exactly within the scope of N3503's responsibilities. Also, compared with J3503, N3503 is more accessible because it no longer engages in military-related production activities. With the help of one of the leaders of N3503, the author was finally able to gain access to the Real Estate Data Department located in #1XC, a subordinate department of N3503. In fact, in the subsequent morphological evolution section, all the relevant historical drawings of the community are gained from here. As for the administrative section, the limited archives of the Real Estate Data Department cannot provide direct help. But through talking with the leader of the department, the author can gain needed oral data about the administrative evolution of #1XC. In addition, the leader of the residents' committee to which #1XC belongs can also offer relevant information. However, due to the fact that neither of these two leaders have worked very long in their current positions, they cannot offer too much information about the historical management mode of the community, especially before 2000. Considering the inaccessibility of J3503's archive, the author finally decided to explore the community's management mode before 2000 through conversations with some elderly retirees of the work-unit, who have been living in the community for a long time. Undoubtedly, the oral descriptions from these elder residents are not so official. However, based

on the analysis of the other two case work-unit communities, it can be inferred that #1XC had also been mainly managed by certain departments of the work-unit before the official end of the national housing reform in the late 1990s. All in all, considering the abovementioned factors, this study will not elaborate on the evolution of the specific management department of the community before the 1990s. After all, no matter how it changes, it had always been certain subordinate departments of the work-unit itself as the other two cases. Instead, the research focus in this section is on the administrative evolution of the community during the past twenty years, that is, after the official end of the national housing reform in the late 1990s.

There are mainly two authoritative interviewees who can offer relevant data for the research, one from N3503 and the other from the residents' committee. In addition, there is a staff from the Real Estate Data Department, plus a number of elderly residents living in the community. For convenience, in this research, these interviewed residents will be collectively referred to as **Rs**. Here is a brief list of their basic information. Similar to ISSC, this thesis will not disclose their private information and will replace their full names with initial letters of their last names. The list is sorted according to the time of the interview.

T is one of the leaders of N3503. He not only helped the author obtain the historical drawings of #1XC, but also has a good understanding of the construction and development of the community after 2000, such as the abovementioned four-phase residential projects, the commercial housing project in the center, and the two commercial projects in the original working quarter. In fact, after the Factory moved to a new site in 2003 geographically, the management and development of the vacant working quarter and the old living quarter are all in the charge of specialized departments dominated by the logistic department. In 2010, these departments were reorganized into the new company N3503, which is independent of the new

production-oriented company J3503. Thus, as one of the main leaders of N3503, **T** is quite clear about the evolution of #1XC during the past two decades, including both the administrative and morphological ones, and has provided valuable oral data.

X is a leading cadre of Residents' Committee of H community and she started working there in 2003. Thus, she is relatively familiar with the administrative changes in #1XC during the past 17 years.

Z started to work as an assistant in the Real Estate Data Department of the Development Zone Management Committee (renamed Property Management Department in 2020). The latter is a subsidiary department established by N3503 in #1XC, mainly including the Real Estate Data Department and the Maintenance Team. The committee is directly responsible for the management and redevelopment of the community and the original working quarter. During the field investigation, she assisted the author in the shooting of the historical drawings and provided the author with some supplementary information on the management evolution of the community.

Rs is the collective name of all the residents interviewed by the author during the field investigation, among which are mainly elder retirees of the work-unit. In addition to providing some supplementary information after 2000, they are the main information providers of the administrative evolution history of the community before 2000. The data before 2000 was thus relatively vague and messy. However, as mentioned earlier, based on the analysis of the other two case work-unit communities, it can be inferred that #1XC had also been mainly managed by certain departments of the work-unit before 2000. And it's enough to know this. The focus of the analysis on the administrative evolution of the community is after 2000, a period in which T and X can be authoritative data providers.

Looking back at the previous two cases, in XNVC, the official end of the national housing reform in 1998 and the geographical relocation of the working quarter in 2015 are deemed as two key turning points for the change of the administrative mode in the community. In ISSC, except for the turning point when the national housing reform officially ended in 1998, there are three more turning points for ISSC, namely, a less professional property management company stepped in in 2010, the property management office of the street office took over the responsibility in 2015, and finally a professional property management company settled in August 2020. Similar turning points can also be extracted in #1XC.

Judging from the brief evolution of the work-unit that #1XC belongs to from the 1950s to today, similar to XNVC, the working quarter moved to a new site geographically in 2003. In XNVC, a homeowners' committee was established in the same year when the working quarter moved out. After a period of exploration and experimentation, it eventually developed into a mature homeowners' self-governing management committee two years later and has signed a contract with a property management company, which is mainly responsible for the parking management in XNVC. In #1XC, however, it was not until 12 years later (2015) that N3503 hired a similar property management company to deal with the parking issues in the Old Community. Thus, in this case, the relocation of the working quarter in 2003 was not deemed as a particularly critical turning point for the administrative evolution of the community. Instead, the arrival of the property management company in 2015 is one. Besides, as mentioned earlier, in 2010, the Factory was reorganized into two independent companies- J3503 and N3503, which can be deemed as another key turning point during the administrative evolution of the community. [Figure 4-58] Last but not least, according to **Rs**, around 2000, shortly after the official end of the national housing reform, the local government's influence in #1XC began to

be strengthened. This was mainly manifested in the reorganization and regularization of the residents' committee. It is said that before 2000, residents' committee of #1XC was mainly composed of retirees from the Factory. Afterwards, the staff was mainly designated by the local government. According to some official records, #1XC was indeed zoned into the current Residents' Committee of H community in 2000. In addition, the national housing reform ended officially around 2000. Taking these relevant factors into account, 2000 was finally identified as another key turning point in the administrative evolution of #1XC.

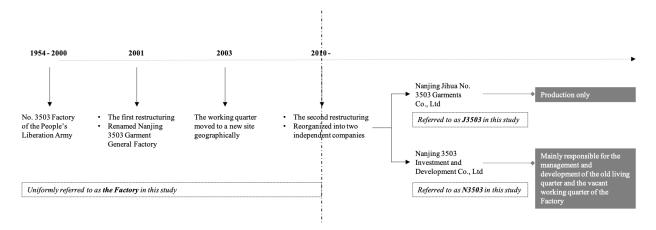


Figure 4-58 The brief evolution of the work-unit that #IXC belonged to from the 1950s to today

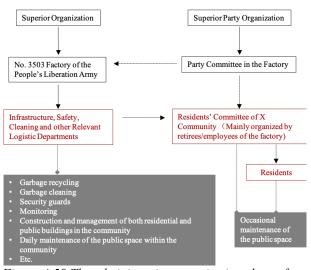


Figure 4-59 The administrative organization chart of #IXC before 1995

Based on these three turning points (2000, 2010 and 2015), the following administrative organization charts of #1XC during the past seven decades can be drawn.

[Figure 4-59 to Figure 4-63] Like the previous two cases, in these charts, red fonts refer to the department or personnel involved in the community management and the white text on a gray background refers to the job it does.

As described earlier, due to certain reasons, the data on the administrative evolution of the community before 2000 was relatively vague and messy. However, based on the analysis of the other two case work-unit communities as well as the oral descriptions of several elder retirees living in the community for a long time, plus the fact that the national housing reform had not yet been carried out at that time and the houses within the community still belonged to the workunit, it can be inferred that #1XC had also been mainly managed by certain departments of the work-unit before 2000, such as the infrastructure, safety, cleaning and other relevant logistic departments. During those years, as the main manager of the community, the Factory had been undertaking various tasks within the community, including the garbage recycling, garbage cleaning, security guards, monitoring, the construction and management of both residential and public service buildings in the community and the daily maintenance of the public space within the community. In the meanwhile, the community has its own residents' committee, which, however, was mainly organized by retirees or employees of the Factory and wan not so official. The committee would occasionally maintain the public space of the community, most of which were voluntary. On the whole, the management mode of the community during this period is relatively simple, which is a work-unit centered mode.

It is noticeable that in Figure 4-59, 1995 is taken as a turning point, but in fact it is not as critical as the three turning points of 2000, 2010 and 2015. It is listed separately only because that, according to **Rs**, in 1995, a government agency- the Institute of Environmental Health Management began to take over the job of garbage cleaning and recycling in the community from the Factory. In fact, until today, the Institute is still responsible for the garbage cleaning and recycling in the Old Community. Apart from this, the management mode of #1XC has not changed much before and after 1995, which has been a work-unit centered mode. [Figure 4-60]

- The Institute of Environmental Health Management began to take over the sanitation work of #1XC around 1995
- · Residents' Committee of X Community came under the jurisdiction of S Street Office in 1996

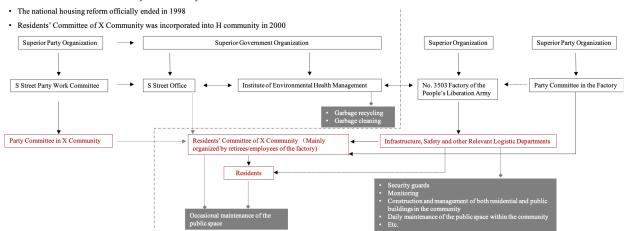


Figure 4-60 The administrative organization chart of #IXC in 1995-2000

Then came the year 2000, one of the most critical turning points in the administrative evolution of the community. In this year, the national housing reform has just ended officially. Most residents have bought the property right of their houses from the work-unit at a relatively lower price, along which the work-unit's power in the management of the community had been greatly weakened. In the meanwhile, with the strengthening of the rights of the local government, the original residents' committee of #1XC was incorporated in Residents' Committee of H Community, forming an official residents' committee ever since then.

Significant changes have taken place in the parties responsible for various affairs in the community. For instance, the newly formed residents' committee began to partially maintain and improve the public space of the community with the support of the occasional "Serve the People" projects of the local government. Besides, because they already own the property rights of their houses, residents began to be responsible for their own houses, and the work-unit was mainly responsible for the maintenance of the public section of these residential buildings. In addition, in order to take care of certain retired employees and those living in difficulties, the Factory hired them to be security guards at the entrance of the community at a lower salary. But

compared with the professional security personnel assigned by the work-unit's security department before, this is a very informal security method. According to **Rs**, these guards basically just sit at the entrance and didn't care about anything. As for the work-unit that was mainly responsible for the management of various affairs in the community, since 2000, only certain departments have assumed the responsibility of managing public service buildings and the remaining small number of rental housing in the community. [Figure 4-61]

- Nanjing 3503 Garment General Factory moved away physically in 2003
- H Community came under the jurisdiction of Y Street Office in 2004

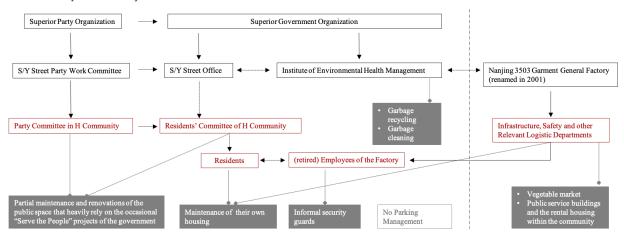


Figure 4-61 The administrative organization chart of #1XC in 2000-2010

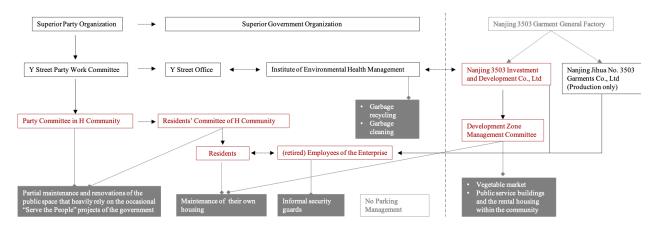


Figure 4-62 The administrative organization chart of #1XC in 2010-2015

Another key turning point occurred in 2010. In this year, the Factory was reorganized into two independent companies, namely, Nanjing Jihua No. 3503 Garments Co., Ltd (J3503)

and Nanjing No. 3503 Investment and Development Co., Ltd (N3503). Since then, J3503 is only responsible for production-related matters, while N3503 is mainly reorganized from the original logistic department of the Factory. Naturally, in the management of the community, N3503 became the successor of the original work-unit. Its main responsibility includes the management and redevelopment of the original site, the daily maintenance and management of the old living quarter, and the welfare of certain retirees. Also, in order to facilitate the direct management and development of the original site, both living quarter and working quarter included, N3503 has set up a Development Zone Management Committee in the community. According to **Z**, there are mainly two departments in the Committee, namely, the Real Estate Data Department and the Maintenance Team. As the names suggest, the Committee is mainly responsible for the operation, management and maintenance of public service buildings and the small number of rental housing in the Old Community, as well as the land development of the original working quarter. This can be seen as the continuation of the responsibility of the original infrastructure department of the Factory. But it can be judged from the responsibilities of these two departments that the management of the public space of the Old Community by the new workunit representative or N3503 has been weakened. [Figure 4-62] Then by comparing Figure 4-61

and Figure 4-62, it can be seen that the administrative management mode of #1XC has not changed significantly around 2010 except for the newly formed company- N3503.

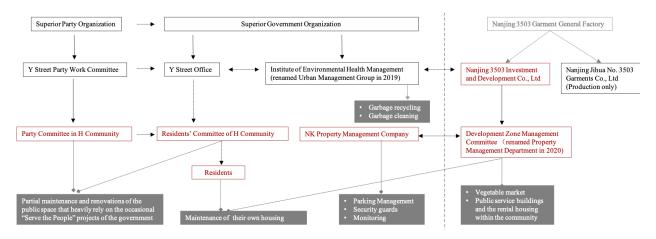


Figure 4-63 The administrative organization chart of #IXC in 2015-

In #1XC, 2015 was selected as a key turning point because a property management company (NK) began to settle in after signing a contract with N3503 and its work mainly includes the parking management, security guards and monitoring. But as a staff of NK described, NK is only responsible for the property management in the Old Community, not the normal property services, which is similar to the property management company hired by the homeowners' self-governing management committee in XNVC. In other words, by dividing parking spaces in the Old Community and setting up security guards at the entrance, they are only responsible for the charging and management of parking in the Old Community. And X and Z also mentioned that there were no lines dividing the parking space in the Old Community before NK settled in 2015, and the parking situation was a messy. In fact, the change in the parking management has been the only major change that occurred in the Old Community in 2015. [Figure 4-63] Since then, the management mode of the Old Community has not undergone any critical changes until today (as of 2020).

On the whole, in #1XC, the Institute of Environmental Health Management began to take the garbage cleaning and recycling work of the community in 1995. The national housing reform officially ended around 2000, and the local government's participation in the community management was strengthened through the restructured residents' committee. In 2010, the Factory was reorganized into two independent company. In 2015, a non-professional property management company began to settle in for the parking management of the Old Community. All these time points can be said to be important turning points in the administrative evolution of the community over the past seven decades. Compared with the previous two cases, however, it is undeniable that the administrative evolution of this community is the slowest, or even inferior. The only noticeable unique aspect is that after the Factory's reorganization in 2010, there has been a specialized company to be responsible for the development and management of the community. But in fact, judging from the community's development in the past 20 years, it can be inferred that, for N3503, the development of new projects has been far more important than the management of the Old Community. On the one hand, these development projects have indeed improved the living conditions of many employees, but at the same time, they have gradually led to the fragmentation of the community in the pursuit of maximizing the land income. The most obvious one is the commercial housing project constructed in the middle of the community after demolishing some buildings in the original living quarter. It is a gated and enclosed district built by a private developer after obtaining the land use right from N3503 and is basically isolated from the surrounding Old Community. In addition, the phase III and IV fundraising housing projects in the community are also gated districts, both of which have further led to the fragmentation of #1XC. Details will be further elaborated in the later section of spatial morphological evolution.

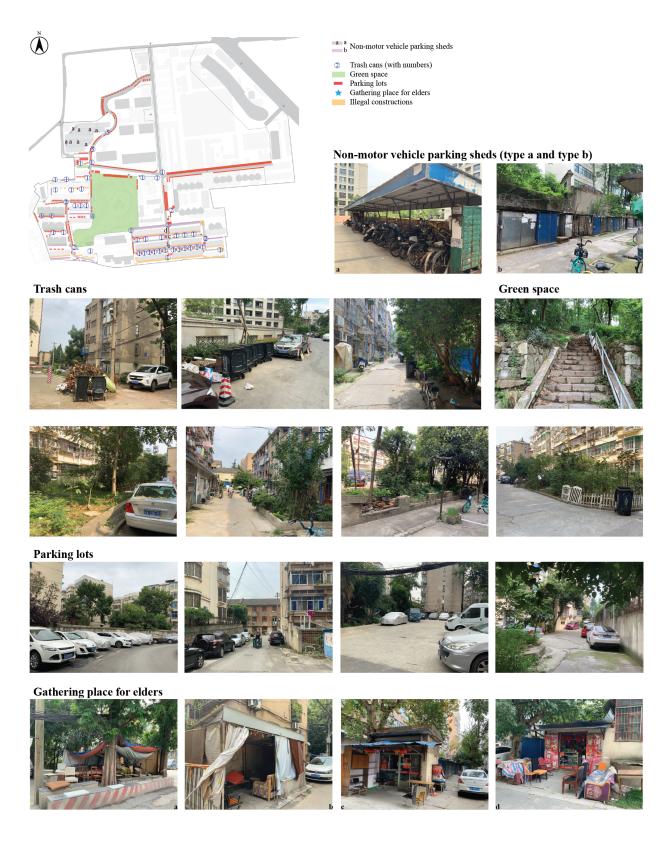


Figure 4-64 The distribution and situation of public infrastructure facilities in #IXC

Similar to the other two cases, in order to visually show and better illustrate the management status of the Old Community, photos of public infrastructure facilities in #1XC are listed below, including the non-motor vehicle parking sheds, trash cans, parking lots, gathering place for elders and illegal constructions within the Old Community. Unless otherwise specified, all the photos were taken by the author in 2019-2020. [Figure 4-64 to Figure 4-67]

There are mainly two types of non-motor vehicle parking sheds in the Old Community. As shown in Figure 4-64, non-motor vehicle parking sheds of type a are located in phase I residential project, which is located in the northwest corner of the Old Community. They were uniformly equipped by the Factory and used as bicycle parking sheds at the beginning. They are very old-fashioned bicycle parking sheds. With the widespread use of electric bicycles, residents are gradually unsatisfied with these parking sheds because of the lack of charging piles in them. In order to charge their electric bicycles, residents would often pull wires from their own homes into the parking sheds, which was quite dangerous. In 2020, by taking advantage of N3503's renovation of the underlying vegetable market, Residents' Committee of H Community installed modern charging piles for some parking sheds of type a, and the charging environment of electric bicycles has been greatly improved since then. [Figure 4-65]



Figure 4-65 Added charging piles in some non-motor vehicle parking sheds (type a)

Except for these parking sheds in phase I project, the rest ones in the Old Community basically belong to type b. Judging from Figure 4-64, this type of parking sheds are actually

being used as private storage rooms by residents now. According to **Rs**, these storage rooms were originally bicycle parking sheds built uniformly by the Factory. A few years later, due to frequent thefts, some residents began to enclose the bicycle parking sheds and add door locks to them, which actually was a first-come, first-served behavioral model. Then bicycles were gradually eliminated, and residents began to use the enclosed space as their private storage rooms until today. On the whole, these single-row storage rooms are relatively uniform, but the quality is uneven. And the debris stacked in them also poses certain safety risks. Although Residents' Committee of H Community has begun to call on residents to empty them in recent years, due to lack of effective implementation mechanism, the goal has not been achieved so far.

The garbage cleaning and recycling work in the Old Community is relatively satisfactory. Since the Institute of Environmental Health Management took over the job from the Factory in 1995, the Institute has been responsible for the garbage cleaning and recycling in #1XC. And unlike the voluntary cleaning in the case of ISSC, the Institute has been implementing standardized work in #1XC. According to an employee of Residents' Committee of H Community, a few years ago, the Institute has begun to equip employees with work bracelets to monitor their working locations and hours, so as to ensure the quality of their work. Besides, as can be seen in Figure 4-64, the distribution and number of trash cans in the Old Community are relatively appropriate. It is worth mentioning that from November 2020, Nanjing city has begun to fully implement the classification of domestic waste. It is believed that the garbage collection in #1XC will be a different story in the near future. And of course, the new policy will also affect the other two case work-unit communities.

Compared with the garbage-related work, the management of the green space in the Old Community is not so satisfactory. As shown in Figure 4-64, the largest green space in the

community is Miao'er Mountain in the south. As T described, the property right of the mountain has always belonged to the Factory, but it is now used a public space. There is no dedicated department that is responsible for the maintenance of trees and vegetation on the mountain. In the past few years, in order to attract more people to buy their houses, the private developer of the adjacent commercial housing project (RY) has carried out some maintenance and partial renovations on the mountain. Apart from this mountain, other green space in the Old Community are mainly small green belts between residential buildings. Most of these green belts were designed and constructed simultaneously with those residential buildings by the work-unit at the beginning. Today, like Miao'er Mountain, there is no dedicated department to maintain them. As Rs described, tree branches are too long, there is a lot of garbage and wild grasses in the green belts... X, the secretary of the residents' committee stated that these tasks should actually be done by the work-unit who once owned the property right of the community, that is N3503 now. And the Committee only can do some auxiliary and coordinated work.

Before the popularity of cars, there were no parking-related problems in the community. After 2000, the number of private cars gradually increased. However, as mentioned earlier, the security guards arranged at the entrance by the work-unit were mostly retired employees living in difficulties during that time, thus they were informal and did not undertake the work of vehicle management. And the parking in the community was rather chaotic. Until 2015, NK property management company settled in the Old Community and began to take over the job. The company divided the parking space with lines in the Old Community and has arranged security guards at the entrance to charge and manage vehicles. It can be seen from Figure 4-64 that, similar to previous two cases, since the prevalence of private cars was not considered at the beginning of the construction of the community, they can only use all the available space in the

Old Community to arrange parking space. This should be the best way to solve the parking problem in those old work-unit communities so far.

Since most of residents living in the Old Community are elderly people and the majority of them are retired employees of the original work-unit, the space for them to gather and chat are indispensable. As of July 2019, when the author did the field investigation there, there are mainly four such resting places in the Old Community. As Figure 4-64 shows, place a was built by residents with simple materials such as fabrics, ropes, and templates, and supported by surrounding trees. They also spontaneously move some idle stools and chairs at home here. This was a simple but useful small space. But in fact, before this, there were only a few sofas discarded by the residents in place a. Then after the nearby building No. 35 was demolished, the shed in Figure 4-64 was built. In 2020, in order to improve the spatial environment of the Old Community and the living environment of the elderly, after demolishing the original shed built by residents themselves, Residents' Committee of H Community funded and constructed a new wooden pavilion on the original site. [Figure 4-66] Place b was originally a simple pavilion built by Residents' Committee of H Community a few years ago. Later, in order to keep warm, some residents used some simple materials to enclose it. There are also chairs and sofas donated by residents inside. But as the residents' committee built another wooden pavilion nearby, which is similar to place a, as X stated, place b will be soon demolished. Place c and d are two spontaneously formed gathering places in front of two small shops.



Figure 4-66 The evolution of place a (photo of 2006 comes from Zhang, 2005^{17})

In addition to the abovementioned public infrastructure facilities, illegal constructions can also reflect the management situation of #1XC visually. As Figure 4-67 shows, there are mainly four types of illegal constructions in the Old Community. First, illegal extensions at the first floor of the building. For the old residential area in the southeast corner of the Old Community, as **Rs** described, these first-floor extensions were unified built by the work-unit when the residential buildings were constructed. But it was just a simple enclosure at the beginning, and it was the residents themselves who later added and rebuilt the extensions. Today, most of the first-floor courtyards have been enclosed by residents into individual rooms. Among them, one of the households took advantage of its location and opened a small shop at the end of the enclosed room. On the other hand, on the south side of building No. 29, there are also some first-floor extensions. But different from the former ones, these extensions are relatively rundown and disorderly. They were spontaneously built by residents and could be seen as illegal constructions literally. Second, illegal additions used as gathering space. This part mainly refers to the place a and b described earlier. No more repeated descriptions here. Third, illegal additions used as storage space. There are mainly two kinds of storage space. One is the scattered storage rooms built by residents in front of and behind their houses, which look like the prefab house on

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¹⁷ "A Study on the Institutional and Spatial Transition of Danwei Community in China Take Nanjing 3503 Factory Community as an Example." Accessed November 18, 2020. http://d.wanfangdata.com.cn/thesis/W2033808.

a construction site. The other one is the bicycle parking sheds initially set up by the work-unit that have been spontaneously enclosed by residents into individual storage space later, which has been described earlier. Fourth, illegal additions used as functional rooms. This kind of illegal construction refers to rooms built by building walls, or between the gables of the two buildings, or along the boundary walls of the community. Residents often regard them as part of their daily lives, such as using them as kitchens, tool rooms, or even bedrooms.



Figure 4-67 Illegal constructions in #1XC

In short, judging from the status of these public infrastructure facilities, including nonmotor vehicle parking sheds, trash cans, green space, parking lots, and gathering places for elders, and the illegal constructions in the Old Community, the current management status of #1XC can be said to be the worst among the three work-unit community cases in this research. Besides, as mentioned earlier, the increasing fragmentation also has a strong impact on the Old Community's original spatial structure. As mentioned earlier, the property management company employed in XNVC is also only responsible for the parking management of the community and does not have other formal property service functions. But because it has its own homeowners' self-governing management committee, plus the fact that its residents' committee is doing a great job with the cooperation of active resident volunteers, XNVC is currently running well with the cooperation of different parties. As for the case of ISSC, both the unprofessional property management company before 2015 and the property management office of the street office later were quite disappointing in the management of the community. However, in August 2020, a new and professional property management company settled in ISSC for trial operations. Within a short period of three months, the living environment of ISSC has been improved significantly. And according to the description of W in ISSC, this model of responsibility handover from the street office to the professional property management company has a brilliant prospect. (Please refer to Section 4.2) By comparison, it is found that the administrative evolution of #1XC is in a relatively lagging state. Except for the parking management, the maintenance of other public space in #1XC is basically in the state of sanbuguan, which is mentioned in the case of ISSC and means that none of the three parties care about the community, including the property management company, Residents' Committee of H Community, and N3503 in #1XC. The future development of #1XC is not optimistic, and residents do have a stronger desire for the

retrofitting and renovation of the community. But at the same time, it must be admitted that the residents' committee here indeed has done some work, such as the installation of charging piles in the phase I residential area, the construction of two new wooden rest pavilions, and the call to empty those illegal storage rooms in the Old Community. And N3503, on the other hand, is mainly responsible for matters related to real estate and land development in the community and would only occasionally maintain the public sections of the Old Community.

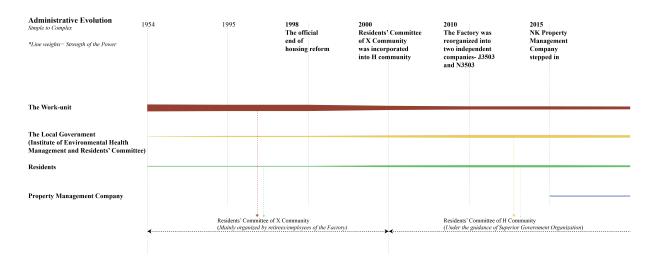


Figure 4-68 The administrative evolution in #1XC through the 1950s to the 2010s

According to the above analysis of the administrative evolution of #1XC from the 1950s to today, a diagram that can reflect changes in the strength of the power of all the parties that have involved in the management of the community in the past seven decades can be drawn.

[Figure 4-68] First of all, similar to previous two cases, the overall administrative evolution of #1XC is a process from simple to complex. As can be seen from Figure 4-68, before the national housing reform ended officially in 1998, #1XC was mainly managed by the work-unit, including the construction and maintenance of residential buildings and various public service buildings, the maintenance of the public space, cleaning and the security guard. The residents' committee that was mainly organized by retirees and employees of the work-unit was playing a supporting

role and its strength of power was relatively small. The influence of the local government was also small. With the end of the national housing reform around 2000, almost all residents had purchased the property right of their own houses from the work-unit at a lower price. The workunit no longer directly managed these houses, and its strength of power in the management of the community had been greatly weakened. Instead, the new homeowners began to take responsibilities. In the meanwhile, with the formalization of local government agencies, the work-unit began to transfer certain rights to the local government. The original residents' committee composed of retirees and employees of the work-unit was merged by the new Residents' Committee of H Community, which can be said to be a subordinate agency of the local government in the country. Since then, the local government has become one of the important participants in the community's management. In the next 20 years, the strength of the power of each management party in the community has basically not changed much, except for the addition of a property management company in 2015. But as mentioned earlier, this company is only responsible for the parking management in the Old Community, thus its participation has little effect on the original power allocation ration of the community.

Last but not least, although it is a simple to complex process like the previous two case work-unit communities, the administrative evolution of #1XC has an obvious characteristic. With the end of the national housing reform, the participation of the original work-unit in these three communities has been all greatly weakened. In the case of XNVC, the homeowners' self-governing management committee formed by residents and the residents' committee are currently the main participants in the management of the community, and the original work-unit has basically withdrawn. In the case of ISSC, the expected official homeowners' committee and the newly settled property management company are expected to become the actual managers of

the community in the near future. Its original work-unit has basically withdrawn too. However, the work-unit in #1XC has been continuing to play an important role in the management of the community for the next 20 years, until today. This is precisely because the original work-unit was reorganized in 2010, in which the original departments that were responsible for community-related matters was separated into an independent company and continued to undertake similar tasks.

Looking at the administrative evolution of #1XC in the past seven decades, it can be found that in the whole process, the main management parties involved include the work-unit, residents, local government agencies, and the property management company that joined later. According to the definition of self-organizing system by Haken (Please refer to Section 1.5), for this case, forces of all these four parties in the management of the community can be regarded as internal or non-specific interferences from the outside. First of all, there is no doubt that the work-unit and residents have been internal forces of the community. Before the housing reform, the work-unit had been responsible for various construction activities and maintenance work in the community. Although there were many issues that work-unit needed to apply for approval from the higher-level government department, this was a bottom-up behavior mode, rather than the "specific interference" imposed on the work-unit or the community by the higher-level government departments. As described in Section 4.1.2, under the premise of satisfying the national policy, the leaders of the work-unit would first decide what need to be dismantled and what need to be built according to the actual living needs of residents in the work-unit community, and then they will report the needs to higher government and start the construction activities after getting the permission. At the same time, residents used their own means to assist the work-unit to maintain the daily operation of the community, such as establishing the family

committee, the residents' committee or volunteering to help. At that time, the community was a typical enclosed work-unit community, which has been constantly evolving under the combined effect of varieties of internal factors, among which the work-unit was the most critical one.

Then with the completion of the national housing reform, the local government gradually began to join the management of the community, mainly including the Institute of Environmental Health Management, which began to undertake the work of cleaning and recycling the community's garbage around 1995, and Residents' Committee of H Community, which brought the community into its jurisdiction in 2000. But reviewing the development of the community over the past 20 years, it is not difficult to find that these two institutions have always been playing roles of auxiliary. Needless to say, the Institute of Environmental Health Management has been responsible for the garbage cleaning and recycling in the community since 1995 and no more community work is involved. The role of Residents' Committee of H Community is a bit complicated. As mentioned in Section 4.1, in P.R. China, the residents' committee is in principle an autonomous organization of residents, and the street office is the most basic level government agency. But in fact, due to various practical factors, the residents committee in the country is more like an executive agency of the street office, and many people regard it as the most basic organization of the government. Thus, this study also considers it as part of the local government. But even so, in the actual management of #1XC, Residents' Committee of H Community mainly undertakes some "soft" tasks, such as the publicity and education of national policies, the distribution of certain social welfare, and the mediation of residents' disputes. "Hard" tasks are rarely involved, such as the maintenance of buildings and the public space in the community. Therefore, it can be said that, just like the Institute of Environmental Health

Management, the participation of Residents' Committee of H Community in the evolution of the community also belongs to non-specific interference from the outside.

In 2010, the original work-unit was reorganized and the original department that was responsible for the management and development of the community and the original working quarter was divided into a separate company- N3503, which continued to undertake the similar tasks. Around 2015, chaos caused by parking issues in the community prompted the key internal factors of the community- residents and N3503, to seek corresponding solutions. In the end, N3503, on behalf of all residents, hired a property management company to manage vehicles in the community. In this way, the join of the property management company also does not belong to "specific interference" from the outside.

All in all, these four management parties and other internal factors in the community have been working together to promote the continuous self-organizing evolution of the community. For instance, the non-equilibrium between the lag of functions and the changes of residents' demand is the main power resource for the continuous evolution of the self-organizing system, such as the increasing demand for individual kitchen and bathroom, then the enlarged hall and finally the independent living room. Also, the join of the property management company due to the parking chaos is also a manifestation.

Here, the role that N3503 has been playing in the evolution of the community in recent years has to be further clarified. On the one hand, as the successor of the original work-unit, it should be the most critical factor in the self-organizing system of the community and should undertake various management and development issues in the community and the adjacent site of the original working quarter. But in fact, N3503 has been paying much more attention to the latter than the former, ignoring the management of the public space in the Old Community and

showing great interest in maximizing land interests. Since the Factory relocated in 2003, the redevelopment of the original working quarter is indeed understandable, but the intervention in the work-unit's original living quarter-#1XC, has been somewhat rude. The intervention is mainly achieved by demolishing original public service buildings in the living quarter. In the case of XNVC, the original work-unit has rented out most of those public service buildings to realize the harmonious regeneration of the community while gaining certain profits. In this case, however, a large number of original public service buildings, some residential ones included, were demolished. Part of the acquired vacant land was sold by N3503 to a private developer for the development of a commercial housing project. At the same time, in order to resettle those residents who have lost their houses in related development projects, after demolishing several original two-story houses in the south of the community, N3503 and the private developer jointly developed and constructed a resettlement housing project on the site, which is also a gated one. Under the influence of a series of development projects led by N3503, coupled with the gradual increase of homebuyers and tenants from the outside, the original physical and psychological boundaries of the community have been broken, and the internal space has become fragmented. The original enclosed self-organizing system of the community has been affected heavily and the atmosphere of the original work-unit communities was destroyed too. The past glories of the community can only be learned from the few elders in the community.

Nonetheless, it cannot be said that the current development trajectory of the community is wrong or bad. It has a development path that is significantly different from the previous two cases but may represent a type of work-unit community. Under the impact of various forces introduced by N3503, the Old Community may gradually decline, be demolished, and eventually die. However, it is also possible that under the influence of these new forces, the relevant

department will pay enough attention to it and its vitality might be renewed. But in any case, the community can no longer go back any more.

4.3.1.2 Morphological evolution

The analysis of the morphology evolution of #1XC will also be carried out through the immaterial social morphology and material spatial morphology. The population composition changes and property right changes are two key elements in the analysis of the social morphological evolution. And the analysis of the spatial morphology evolution will be carried out at three levels, namely, the building level, the community level and the city level.

Before starting the analysis, there is a need to redefine the research scope in this section. As explained at the beginning of the section of the administrative evolution, the phase III project (2010) is excluded due to the fact that it was constructed in the land of the original working quarter and it itself is an enclosed and gated district with its own property management company. Also, the commercial housing project RY (2016) is an enclosed and gated area with its own professional property management company. The phase IV resettlement housing project (2019) has just been completed and the residents have not yet moved in. But it is planned as an enclosed and gated district with its own property management company, just as the phase III project and RY. As a result, even though RY and phase IV project are both located within the original living quarter, they are excluded in the section of the administrative evolution because they have their own property management companies from the beginning. In a word, for the administrative evolution analysis, the research scope of the study after 2016 only incudes the fifteen existing old building built intermittently during the 40 years from 1954 to 1995, the phase I and phase II fund-raising housing projects completed in 2000 and 2004 respectively. And these areas are collectively referred to as the Old Community in this research.

But in the section of morphology evolution, especially the spatial one, these three projects are all changes related to the community. First, despite that it was constructed in the land of the original working quarter, phase III project was constructed by the Factory and distributed to its employees. And this area still belongs to #1XC administratively, which can be seen from its name- building No. 17-22 of #1XC. Second, the phase IV project was built jointly by N3503 and YT after demolishing some buildings in the community. It has just been completed and

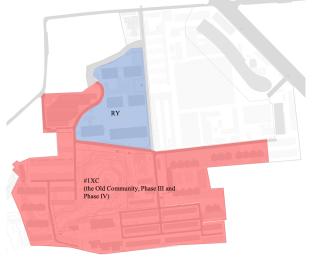


Figure 4-69 Research scope of the morphological evolution of #IXC after 2010

residents have not yet moved in. The project hasn't had a name yet, but the three buildings in the project have been numbered as building No. 23-25, which is in line with the building No. 17-22 in phase III project. Thus, it can be speculated that it will also be divided into the administrative scope of #1XC as phase III. At last, the situation of RY is a bit complicated. It was constructed

after demolishing certain buildings in the original living quarter, which is obviously part of the morphology evolution of the community. But in reality, it does not belong to the community administratively since a private developer (YT) has bought the land use right from N3503 and developed it into a commercial housing project. Therefore, in the morphological evolution analysis, the research scope includes both the Old Community and the three enclosed areas. And except RY, the rest area can be collectively referred to as #1XC or the community. [Figure 4-69]

1. Social Morphology

Similar to XNVC and ISSC, the social morphology tends to evolve from single to complex in #1XC. As to population compositions, residents of the community were all

employees of the Factory and their families before the housing reform. With the privatization of the housing in the community, these housing-reformed houses can be traded on the market like other commercial houses, and they can also be rented out. As a result, the population composition of the community has become more and more complicated. Now there is a mixture of retirees and their families, outside homebuyers and tenants within the community. However, it is found that retired employees from the original work-unit and their families still account for a larger proportion in the community.

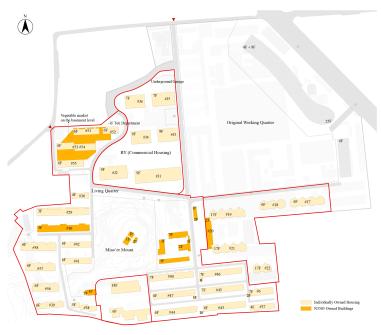


Figure 4-70 The current property right distribution of buildings in #IXC

Similar to population
composition changes, the property
right of all buildings in the living
quarter and the working quarter
belonged to the work-unit before the
housing reform. Then with the
completion of the housing reform,
property rights of almost all the old
residential buildings in the
community have begun to be
transferred to residents themselves.

Only houses in building No. 30, which was originally a dormitory building of the work-unit, have not been reformed and the property right still belong to the work-unit. Residents now living in building No. 30 are all tenants and pay certain rent to N3503 directly or indirectly. The property rights of houses in RY, phase III and IV projects belong to residents from the beginning.

As for public service buildings within the community, most of them have been demolished for land acquisitions. The only ones left include the large vegetable market on the basement level of phase I residential project, a few hospital buildings on the east side of Miao'er Mount., and a small one-story, partially two-story building at the foot of the mountain. In the old residential area in the southeast corner of the community, there are also two two-story small buildings. They used to be garbage houses of the work-unit. After the Institute of Environmental Health Management settled in around 1995, they were both converted into houses. Besides, there are also two smaller buildings originally built by the work-unit to take care of the employees living in difficulties and their functional positioning was small shops. Today, one is still used as a small shop and the other is abandoned. In addition, there are also some buildings in the newly constructed phase III and IV projects that belong to the work-unit, including a row of two-story buildings on the west side of the phase III project, and a two-story, partially three-story building at the west entrance of the phase IV project. Last but not least, the property right of Miao'er Mountain as well as those small buildings on top of it have always belonged to the work-unit. The current property right distribution of buildings in #1XC can be seen in Figure 4-70.

2. Spatial Morphology

The analysis of the spatial morphology evolution of #1XC will be carried out at three levels, namely, the building level, the community level and the city level. The analysis heavily relies on historical drawings of the community. As mentioned earlier, with the help of **T**, one of the leaders of N3503 and the staff of the Development Zone Management Committee- **J** and **Z**, the author can gain access to the Real Estate Data Department located in #1XC, in which historical drawings about the community can be found. Although these drawings are incomplete, only part of the buildings in the community and a few site plans are included, they are very

precious considering the fact that the confidential archive located in J3503 is not accessible. Finally, based on photos of these precious historical drawings took in the Real Estate Data Department and the current situation of the community, the online information as well as the oral narratives of interviewees, the site plans of the community in the 1950s-1970s, 1980s, 1990s and 2000s-2010s, as well as construction drawings of some residential buildings in the community are all redrawn and analyzed. By comparing those site plans as well as construction drawings in different years, the spatial morphology evolution of the community at the three levels can be figured out, so as to explore the existence of certain law, which hopefully is a kind of self-organizing power in this research.

1) Building level

There are mainly two kinds of buildings in #1XC, namely, residential buildings and public service buildings.

a. Residential buildings

As mentioned earlier, drawing materials in the Real Estate Data Department are incomplete, so the author can only redraw part of the residential buildings in the community. Fortunately, these drawings already include buildings constructed from the 1950s to the 2000s. There are totally eighteen residential buildings whose construction drawings can be found in the Real Estate Data Department. To specify, these buildings include building No. 29 and building No. 30 built in 1954, building No. 35, building No. 36 and building No. 37 built in 1976, building No. 38 built in 1979, building No. 40 built in 1982, building No. 41 and building No. 42 built in 1986, building No. 43 built in 1991, building No. 44, building No. 45, building No. 46 and building No. 47 built in 1992-1995, building No. 6 built in 1993 and building No. 56, building No. 57 and building No. 58 built in 2001. All these residential buildings were

constructed by the work-unit before the end of the national housing reform. In fact, in the previous two cases, after the national housing reform ended around 2000 and residents obtained the property right of their own houses, there would be basically no large-scale construction activities in the community. But as described earlier, in the case of #1XC, the situation is quite different. After 2000, especially around 2010, when the Factory was reorganized into N3503 and J3503, a total of three large residential projects have been completed in the community. Specifically, there are five residential buildings in the fund-raising housing project developed and constructed by N3503 in 2010 (Phase III), six commercial residential buildings (RY) developed and constructed by a private developer (YT) after purchasing the land use right from N3503, and two residential buildings for resettlement developed and constructed jointly by N3503 and YT on the south side of the community.

Then with the help of site plans of different years, the approximate construction years of those residential buildings without construction drawings in the archive can be judged roughly. Together with those residential buildings with drawings in the archive, the number of the residential buildings constructed in the 1950s to the 2010s in #1XC can be known. Taking the number of the residential building constructed in different years as the indicator, the diagram of the spatial morphology evolution in #1XC through the 1950s to the 2010s can be drawn, that is, 34 residential buildings in the 1950s, 4 in the 1970s, 4 in the 1980s, 11 in the 1990s, 3 in the 2000s, and 13 in the 2010s. [Figure 4-71] It can be seen that residential construction activities in #1XC continued even after the end of the national housing reform around 2000, and the number is quite large, which is quite different from the other two work-unit communities.

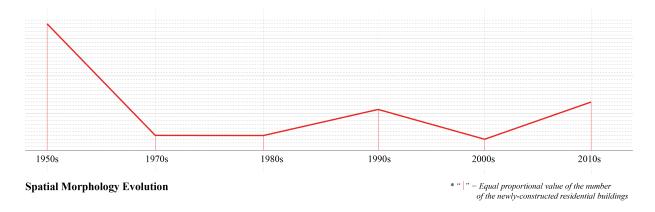


Figure 4-71 The diagram of the spatial morphological evolution in #1XC through the 1950s to the 2010s

In addition, according to the collected construction drawings of the abovementioned eighteen residential buildings whose construction drawings can be found in the Real Estate Data Department, a list of the layout evolution of housing units in #1XC can be obtained. [Table 4-3] As can be seen in the table, certain indicators are adopted to judge the evolution of the housing unit, including the layer numbers, and if there are certain life supporting facilities within the apartment, such as the kitchen, the bathroom and the hall. All these indicators can reflect the residents' living quality to a certain extent.

First, the number of floors of these residential buildings has been increasing over time, from the two-story or three-story ones in the 1950s to the five-story ones in the 1970s, and then to the six-story and seven-story ones after the 1980s. The two-story buildings in the 1950s refer to those two-story brick-wood structure houses that have been all demolished in the community. The residential buildings newly built after 2010 are all six floors or more, and some are even high-rise buildings. The gradually increasing building layers represents the continuous development of building materials and construction technology, and it also means that the practicality, robustness and aesthetics of the building are constantly being improved over years. These are exactly changes driven by the residents' increasing demand for living space and completed by the work-unit correspondingly.

As to the kitchen, from the two three-story building No. 29 and building No. 30 in the 1950s with shared kitchens on the same floor, to the use of widened walkway as the kitchen space, and finally each household has its own kitchen, the whole process also reflects the gradual improvement of residents' requirements for the quality of living space and the corresponding changes made by the work-unit. The evolution of the bathroom is similar to the kitchen. In the 1950s, the whole floor of the dormitory would share the toilet, and then each household has its individual toilet, or bathroom later due to the improvement of toilet facilities and the corresponding increasing toilet area.

The hall space can be regarded as another key factor reflecting the quality of living space. In early days, in order to accommodate more employees, the layout of the housing unit was often very compact. The traffic space could be saved as much as possible, the toilet and kitchen can only meet the most basic requirements, not to mention an open hall that seems to be a waste of space. Later, with the increasing living requirements of residents, the use of the enlarged corridor space as a small hall began to appear, until around 2000, a separate living room began to appear literally.

Table 4-3 The evolution of housing units in #IXC

All in all, similar to the previous two case work-unit communities, from the 1950s to the 2000s, the quality of residential buildings in #1XC has been gradually improved. This can be judged from the increasing layer number of the building, whether there is an individual bathroom and kitchen in the house, and whether there is a hall space. The evolution of housing units in the community can thus be seen as a self-organizing process, in which the residents' growing demand for more privacy and more living space, the management department's corresponding demolishment, constructions and extensions of residential buildings, and the changing road networks, public space and public service buildings all have been working together to maintain the operation of the self-organizing system.

As can be judged from Table 4-3, among all the eighteen residential buildings whose construction drawings can be found, only building No. 29 has ever been extended on the north side by about 2.7 meters around 1994. In fact, the three-story building No. 29 and building No. 30 were both built in 1954 by following the same set of construction drawings. However, from the beginning, building No. 30 was used as a single dormitory while building No. 29, like other residential buildings in the community, was allocated to employees with families. In the subsequent housing reform in the late 1990s, residents of building No. 29 bought the property rights of their houses from the work-unit at a lower price, while residents of building No. 30 did not. Thus, the property right of building No. 30 still belongs to the work-unit and residents continue to rent the houses from the work-unit. Today, however, most of the original residents-employees of the work-unit, have moved out and sublet their houses to outsiders at a price slightly higher than the rent collected by the work-unit, which resulted in a mixture of residents in the building.

After nearly 70 years of evolution, the two buildings with exactly the same spatial layout, structure, and appearance at the beginning have evolved into different states. Reasons include the difference in the positioning population during the initial housing allocation in the 1950s, the difference in the property right after the housing reform in the 1990s and the later different population compositions. Although objectively speaking, current situations of the two are both disappointing, the condition of building No. 29 is relatively better than building No. 30.

All in all, to better illustrate the evolution of residential buildings in the community, building No. 29 is selected as a representative case in this research, which has undergone nearly 70 years of evolution and was extended in the 1990s, and building No. 30 can be used as its reference object. Hopefully, the spatial morphological evolution of building No. 29 can help

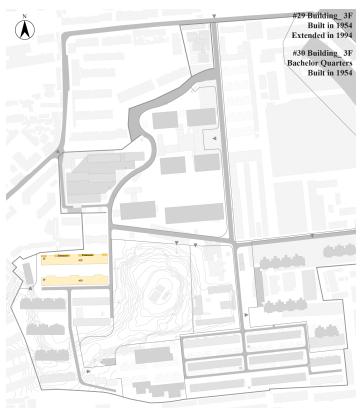


Figure 4-72 The location of building No. 29 and building No. 30 in #1XC

prove the existence of the selforganizing power existed within the community at the building level.

Figure 4-72 shows the location of building No. 29 and building No. 30 in the community. They are arranged in a parallel east-west direction and located on the west side of the Old Community, right between phase I and phase II fundraising housing projects. Their current appearance can be seen in Figure 4-73.

As shown in the figure, the two buildings are both three-story red brick

building. Judging from the exposed areas inside the building, they were constructed with a very simple brick-wood structure. [Figure 4-74] While load-bearing walls are made of red bricks, mud and dried reeds, partition walls between the rooms (non-bearing walls) are only composed of simple wooden boards, mud, and dried reeds. Besides, exposed wooden pillars and wooden floors (ceiling) can be seen too. But it must be pointed out that the extended section of building No. 29 in 1994 was built with a stronger brick-concrete structure. All in all, the two buildings were built in the 1950s with relatively simple materials and structures. After nearly 70 years of evolution, they now look very dilapidated, especially against the surrounding relatively new buildings. But under the dilapidated appearance, what kind of changes have taken place in them during the past 70 years?



Figure 4-73 Current appearance of building No. 29 and building No.30



Figure 4-74 Brick-wood structure of building No. 29 and building No. 30

As mentioned earlier, drawing materials in the Real Estate Data Department are limited.

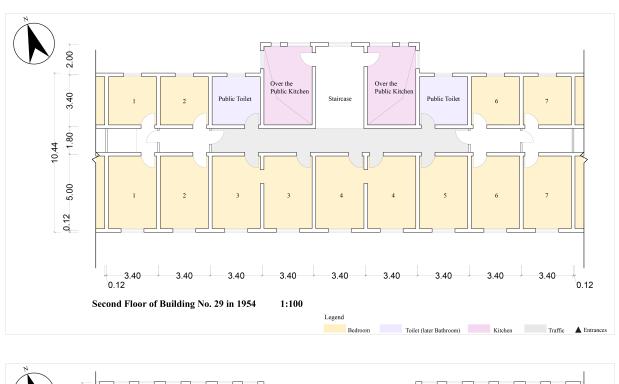
And unfortunately, drawings of these two buildings are incomplete. In the end, on the basis of

the available drawings collected, the author measured dimensions of these two buildings on-site, coupled with the residents' oral narrative, and finally drawn the second-floor plan of building No. 29 and building No. 30 in Figure 4-75 and Figure 4-76. The reason for choosing the second floor is because the author's household survey was conducted in a household living on the second floor.

As shown in the figures, the floor plan of building No. 29 and building No. 30 are identical when they were constructed in 1954. It is a typical layout of a single dormitory. Two public kitchens and two toilets are symmetrically distributed on both side of the stairwell, and the remaining part is two rows of single dormitories set along both sides of an inner corridor. As to the façade of the building, the stairwell plus the two public kitchens on its both sides protrudes about 2 meters on the north side, and the south façade is flat. The floor plan shows the middle section of the whole building. There are totally three sections in the whole building and three stairwells. Thus, there are totally three protrusions on the north façade, each of which is with a triangular roof in the north-south direction that is perpendicular to the east-west building direction.

By comparing the room allocations of the two buildings in 1954, it can be seen that while one room is for one household in building No. 30, basically two rooms are allocated to one household in building No. 29. According to **Rs**, Figure 4-75 shows the distribution of rooms on the second floor of building No. 29. There are 7 households in the middle section and 6 households each in the east and west sections. Thus, there are a total of 19 households on each floor and 57 households in the whole building. In addition, to enhance security and privacy, the three sections of the two building are both separated from each other with partitions. The

difference is that residents in building No. 29 would also add some gates in the corridor within each section. [Figure 4-75]



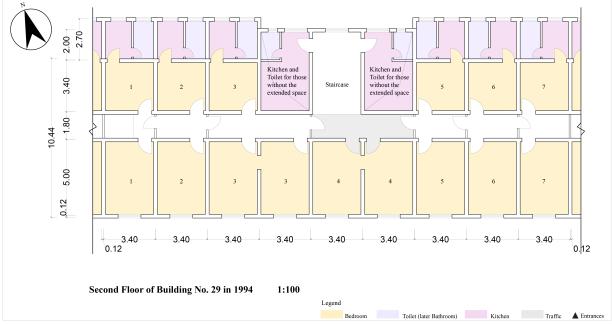


Figure 4-75 Redrawn second floor of building No. 29



Figure 4-76 Redrawn second plan of building No. 30

In 1994, with the increasing living needs of residents, building No. 29 was extended, and the non-protruding part on its north side was expanded by about 2.7 meters, which was used as the kitchen and bathroom space. The original protruding staircase and the public kitchen section then became recessed. In the meanwhile, as residents had their own bathrooms and kitchens, the original public toilets and kitchens were unnecessary. The former, plus the extended space on its north side, was allocated to residents as an independent room, and the latter was allocated to those who lived on the south side and cannot enjoy the extended space as their individual bathroom and kitchen.

The second drawing in Figure 4-75 shows the current room distributions on the second floor of building No. 29. The rooms are numbered by the author based on dictations of residents. It can be seen that household 1 and 2 each has a room on each side of the corridor, that is, a total of two rooms. The extended space on the north side is used as their individual kitchen and bathroom. The original public toilet and its extended space on the north side was allocated to

household 3 and then there are totally 3 rooms in household 3. Both rooms of household 4 are on the south side, thus no extended space was obtained by the family. But it obtained an original public kitchen space next to the staircase and transformed it into its own kitchen and bathroom. Households 5, 6, 7 are basically symmetrical to households 3, 2, 1. With the permission of the homeowner of household 1, the author was able to take some interior photos of her rooms. In addition, plus some other photos of the building, the current situation of building No. 29 can be seen in Figure 4-77.

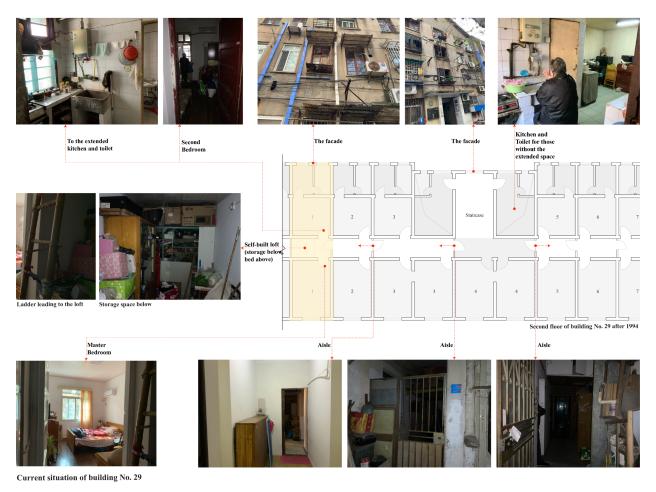


Figure 4-77 Current situation of building No. 29

Household 1 is located on the westernmost side of the second floor in the middle section of building No. 29. After reaching the second floor, one needs to pass through three doors to

enter the house. The first door is located near the entrance of the staircase, separating households 1, 2 and 3 from the others. The second door is located between household 2 and 3, and the last one is the entrance door of household 1. According to the homeowner of household 1, the first two doors are usually locked, only her own entrance door is not. She only has to lock her own master bedroom, because there is nothing valuable in her house. And the author noticed that the entrance door of household 7 on the opposite side is locked.

The homeowner of household 1 is an 84-year-old woman living alone, named L. Her husband was an employee of the Factory and they moved here in 1961. In 1975, her husband passed away, leaving her and four children living in these two small rooms. Now the children all have moved out, but traces of the cramped living space can still be seen in her home. For instance, there is a self-added loft in the aisle space in the middle of the two rooms, with the storage space underneath and the sleeping space above. The wooden ladder that leads to the bed above is still there. According to L, the condition of the rooms was very poor. The exterior walls were leaking, and large black water stains and cracks could be seen on the interior walls. A few years ago, a paint block fell off the roof of the second bedroom and hit her grandson's head. The master bedroom she lives in was redecorated by her son recently, which looks much brighter and cleaner. But she hopes that N3503 can solve the problem of water leakage on the exterior walls of the building as soon as possible. At last, she mentioned that the only advantage of the building is that the height between floors is relatively high, which also explains the self-added loft space in her house.

Figure 4-77 also shows one original public kitchen space that has been transformed into an individual kitchen and bathroom, and the appearance of the extended section of household 1 as well as the staircase section. Last but not least, according to a resident of household 4, except

for households 1 and 7, all other households have to walk through the corridor to go to the toilet, and they themselves have to go down half the stairs to the bathroom, which are quite inconvenient.

As mentioned earlier, building No. 29 and building No. 30 were built by following the same drawings. While building No. 29 was extended in 1994, the layout of building No. 30 has always been the same as when it was constructed in 1954. By analyzing the current situation of building No. 30, the spatial layout of building No. 29 before the extension in 1994 can be better understood. In the building No. 30, due to a lack of individual toilets, two of the original public toilets are still in use, in which the one on the first floor is a public male toilet and the one on the second floor is a public female toilet. The others have been transformed into rooms as building No. 29. Also, the original public kitchens have become increasingly unnecessary despite of the fact there are no extended individual ones for each room. One important reason is that residents in the building are no longer limited to the employees of the original work-unit but have been becoming more and more complicated. Residents would cook in their own rooms or build simple cooking space in the corridor. Currently, the original public kitchen space has different functions. Some are still being used as kitchens by some residents, some are used as storage rooms, and some are in a state of being abandoned. In the photos in Figure 4-78, the sink and other facilities of the original kitchen can still be seen. But anyway, the original kitchen space, the original toilet space, the dark aisles that are full of debris, and the cramped rooms are all in a particularly dilapidated and dangerous state. It can be said that building No. 30 is the one that should be demolished most in #1XC.

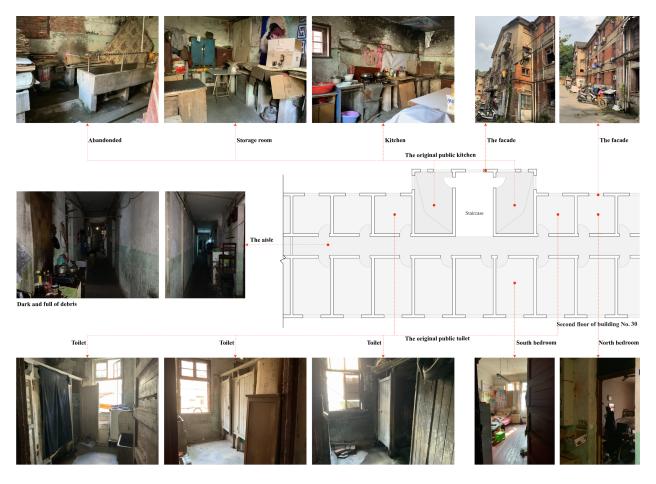


Figure 4-78 Current situation of building No. 30

At last, as explained earlier, in the section of morphology evolution, the research scope includes both the Old Community and the three enclosed areas. Thus, in terms of the spatial evolution of the community at the residential building level, in addition to old buildings like building No. 29 and building No. 30, those built in the four phases of residential projects since around 2000 in the community are also worth a brief introduction. Figure 4-79 shows the current situations of these residential buildings. And it is obvious that since around 2000, the quality of the newly built residential buildings in the community has gradually been improved with the time going by.

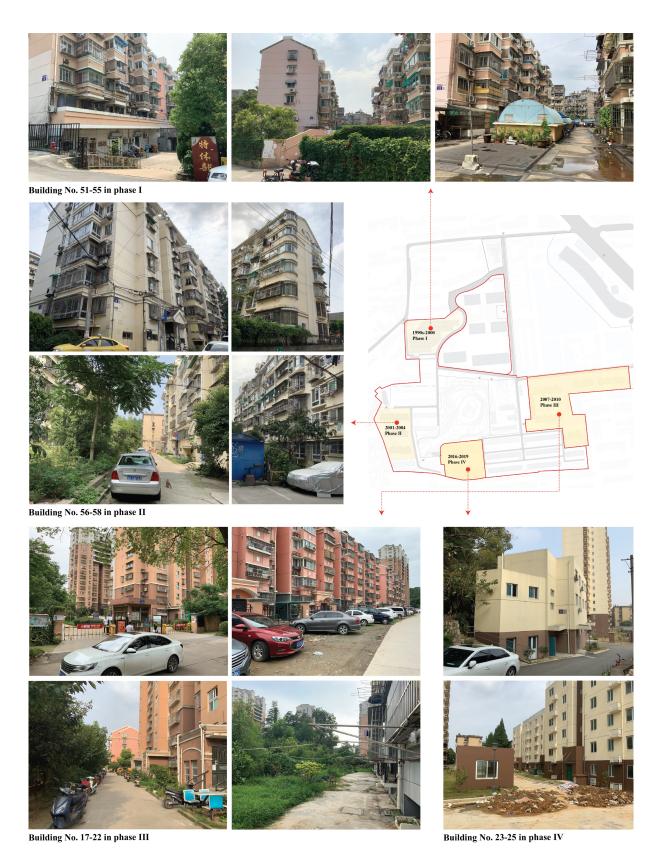


Figure 4-79 Photos of residential buildings built in the four phases in #1XC

In summary, during the past seventy years, the quality of the newly-built residential buildings in the community has been improved, such as the housing unit plan, the building structure, the building material, and the architectural style. There is no doubt that the change has been made by the work-unit under the pressure of residents' increasing requirements for better living space. However, it must be admitted that the maintenance of the completed buildings in #1XC is a bit disappointing. There are many old residential buildings built before the 1990s in the community, and the only one that has ever been extended is building No. 29. The current conditions of these old buildings are very poor, especially the oldest building No. 29 and building No. 30. The roof and exterior walls are leaking, the structure is corroded, and the wall is cracking, all of which have safety hazards. Residents strongly hope them to be repaired or demolished directly. The good news is that, during the field investigation, the author noticed one announcement published by N3503 on December 2, 2020, which states that they are going to repair these old residential buildings in the following days. This shows exactly that, even under the strong impact of the surrounding real estate development, the Old Community is still slowly but firmly self-evolving under the interaction of various factors within itself. And in this study, this is called the self-organizing evolution.

b. Public service buildings

During the work-unit era in P.R. China, for some relatively larger-scale work-unit, there were generally some affiliated public service buildings in its living quarter, which would support the daily life of employees in the work-unit. The most common ones include the kitchen and canteen, infirmary, auditorium, bathhouse, hostel and schools. In the three work-unit community cases in this research, except ISSC, both #1XC and XNVC were once equipped with a wealth of public service buildings due to the larger scale of their affiliated work-units.

Figure 4-80 shows the evolution of these public service buildings from the 1950s to the 2010s in #1XC, which, on the whole, is a declining process. In addition, it must be noted that in the figure, the number of floor and functions of some non-residential buildings in the living quarter have not been marked. This is due to the lack of data and to show the more critical public service buildings more clearly. As can be seen in the figure, there were abundant public service buildings and several non-residential buildings (presumably some warehouses and workshops) in the living quarter from the 1950s to 1970s. Entering the main entrance on the north side of the community, there was a hostel on the left. Then walking along the main road from the north to south of the community, one would see a two-story auditorium and a one-story kitchen and canteen on the right-hand side, followed by the nursery and kindergarten on the left. Moving on, there was a two-story educational department and nursing home and a two-story infirmary on the right-hand side. Then just to the east of Miao'er Mountain was a first-story building used as a bathhouse and a barber shop. At last, there were three one- or two-story water tower buildings on the top of the mountain.

In the 1980s, public service buildings in the community did not change much. The most obvious change was the construction of two new buildings on the east side of Miao'er Mountain, which were located on the north and south sides of the original one-story bathhouse and barber shop building respectively. It was a two-story building on the north side. According to a resident who once worked in the barber shop, this two-story building was the new bathhouse and barber shop, while the original one-story building was changed into a senior retirement office. The new buildings on the south side was the staff hospital and nursing home of the Factory. The main buildings include two five-story buildings on the north and south sides, a three-story building on the west side, and a two-story building on the east side.



Figure 4-80 Evolution of public service buildings in #IXC from the 1950s to the 2010s

In the 1990s, the most obvious changes were the newly built kindergarten on the right side of the entrance of the community and the vegetable market on the basement level of phase I housing project on the west side of the community. The kindergarten building was a three-story,

partially four-story building group. It was built and originally run by the Factory. Later, because there were few school-age children who need to go to a kindergarten in employees' families of the work-unit, the Factory was unable to maintain the kindergarten. Thus, it introduced external funds and established a bilingual kindergarten there around 2003, which mainly enrolled children of residents from nearby communities that also belong to the H community as #1XC. And there were basically no children from the Factory. On the other hand, there was a very concentrated block selling vegetables, fruits and subsidiary foodstuffs on the west of the community, which was one of the main daily purchasing places for community residents. Considering this innate factor, the basement level of phase I fund-raising housing project was built as a non-staple foodstuff store or vegetable market by the Factory at the beginning. Booths inside the market were rented to individuals and the Factory was responsible for the daily management of the market. The commercial form of the market during the early time was at a fairly rudimentary level. The sanitary conditions were poor and the roadside stall businesses were quite common.

Besides, in order to take care of employees that were living in difficulties, with the completion of residential buildings on the south side of the community, the Factory built two one-story houses along the central road and rented them out to employees as small shops. Currently, the one on the north is still being used as a small shop while the other one has been locked and abandoned. In the meanwhile, two two-story houses were also built and used as garbage recycle stations. Then as the Institute of Environmental Health Management took over the garbage cleaning and recycling work in the community around 1995, these two small houses were abandoned. Later, the first floor of the building on the south side was changed into a room and has been used for free by a worker of the Institute, and the second floor could not be used due to its inclined ground floor. The one on the east side is a bit different. It has been renovated

by the Factory and both floors can be used. Currently, a retired employee and his wife are living in this two-story building. He once worked in the Factory's barber shop and is still doing haircut now. As he described, he has been renting the small house from the Factory at a relatively low rent, which is a kind of welfare given to him by the Factory. Correspondingly, his haircut work here can be regarded as a kind of return. The barber shop charges less and can serve the elderly in the community who could not walk too far. [Figure 4-81]



Figure 4-81 The four small buildings on the south side of the community

Since around 2000, there have been basically no newly constructed public service buildings in the community, and the original ones have been demolished step by step for the land acquisition. As mentioned earlier, after the national housing reform ended around 2000, unlike the previous two cases, construction activities in #1XC did not stop, especially after the Factory was reorganized into two independent companies in 2010. The newly established N3503 began to focus on the real estate development. In addition to the land in the original working quarter, the land occupied by those public service buildings in the living quarter has also become their capital for real estate development. In fact, some residential buildings were also demolished during the process. It can be seen from Figure 4-80 that the most concentrated area of the original public service buildings has been occupied by a gated commercial housing project (2016), and the actual area of the community has been greatly reduced as a result. As of 2019, the only remaining major public service buildings in the community are the vegetable market on

the basement level of phase I housing project on the west side of the community and the staff hospital and nursing home on the east side of Miao'er Mountain. It's worth mentioning that next to the vegetable market, specifically on the basement level of building No. 52 in the phase I project, there are now two departments that still belong to J3503, namely, the Teti Department and the Service Center for Retired Cadres. At last, both of the vegetable market and the staff hospital have all recently undergone renovation. [Figure 4-82]

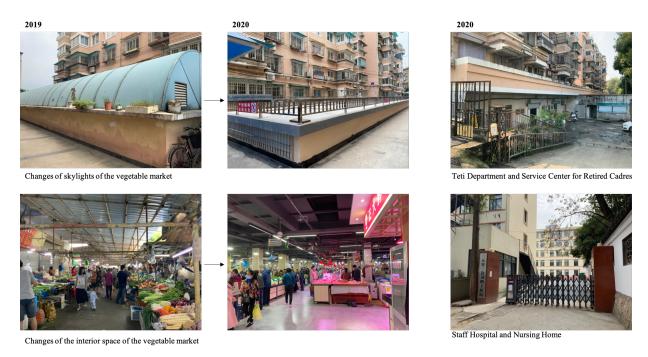


Figure 4-82 Current status of the vegetable market, Teti Department and Service Center for Retired Cadres, and the Staff Hospital and Nursing Home in #IXC

Some sporadic public service buildings are also kept, including the aforementioned two small shop buildings and the two original garbage houses built in the 1990s on the south side of the community and a one-story, partially two-story building at the foot of Miao'er Mountain on the east side built in the 1980s. For the latter, the one-story house on the north end is being used as a small shop and the two-story house on the south end is being used as offices of NK property management company. Last but not least, there are two other buildings in the community that can be counted as newly built public service buildings. One is located on the west side of phase

III fund-raising housing project that was completed in 2010. This is a two-story building that opens to the Old Community. Part of it is being used as offices of Residents' Committee of H Community, and the rest part is being rented to a car repair shop, an educational institution, etc. The other building is located at the west entrance of phase IV resettlement housing project that was completed in 2019. As designed, the ground floor is a public toilet and a power distribution room, the second floor is a public toilet and the room for community, and the third floor is the room for property management. [Figure 4-83]







The one-story/two-story building built in the 1980s

Figure 4-83 The two newly built public service buildings and the one-story, partially two-story building built in the 1980s in #1XC

In the final analysis, the gradual disappearance of these public service buildings is the result of a combination of various factors, among which inner factors of the community are the most critical ones. Since the 1980s and the 1990s, with the disintegration of the work-unit system and the popularity of marketization in the country, residents became homeowners and have greater freedom to choose their lifestyles. In the meanwhile, under the stimulation of increasingly perfect municipal facilities, original public facilities in the community, such as the kitchen and canteen, the auditorium, the bathhouse, the hostel and the kindergarten appear to be outdated and useless. However, unlike XNVC, in which the original public service buildings were all rented out and given some modern functions, in this case, most of these buildings were demolished due to the work-unit's focus on the real estate development. It is undeniable that this

kind of high-intensity development has brought a strong impact on the enclosed atmosphere of the original community. And it is not difficult to find the impact is brought by the work-unit, one of the most critical inner factors in the community. Moreover, there are reasons to believe that the work-unit's choice of the real estate development path should be a decision after comprehensive considerations of various factors. And among these factors, residents' changing living needs should be one of the main incentives. The preserved and renovated vegetable market and staff hospital buildings are the most direct manifestations in today's community. Unlike the bathhouse, auditorium or the canteen, these two are still indispensable public facilities in residents' daily life. Therefore, it can be said that changes in these public service buildings are brought by the two dominant factors in the community- the work-unit and residents, and it is a manifestation of the inner self-organizing power of the community.

At present, whether the real estate development path is good or bad is still inconclusive. Perhaps relevant departments believe that the Old Community has no retained value and will eventually be swallowed up by the surrounding real estate development. Perhaps in the context of the surrounding new market development, relevant departments will deem the Old Community has significant historical value, and thus renovate it, making it reborn. And only time can give the answer.

2) Community level

Similar to the former two cases, the spatial evolution analysis of #1XC at the community level also consists of four key elements, namely, boundaries (including the enclosure form, the number of gates and the entrance space, and the street-facing buildings), the traffic organization, the architectural texture, and the public space (including the green space and the open space, such as the public square and the business street). As described earlier, based on the available

data, site plans of the community in the 1950s-1970s, 1980s, 1990s and 2000s- 2010s are finally deemed typical and redrawn by the author. By virtue of these site plans in different years, the evolution of the four key elements can be figured out by comparisons. The spatial morphological evolution of the community at the community level then can be gained with these four key elements as indicators. Hopefully, a kind of self-organizing evolution trajectory can be found at the community level. [Figure 4-84]

a. Boundaries

As the previous two cases, the community and the working quarter of the Factory are also arranged next to each other geographically at the beginning. The slight difference is that there are also some scattered production-related buildings in the living quarter, such as various warehouses and processing workshops. As can be seen in Figure 4-84, in the 1950s to the 1970s, the overall boundary of the community was irregular and there seemed to be three entrances and exits along the boundary. First, there was one main entrance on the north side of the community, and this entrance was strictly controlled at that time. Residents needed identifications and visitors needed to register to enter and exit the community. In addition, there was another entrance from the outside in the area where phase I residential project was later constructed. At that time, the area was mainly used as a garden, a coal yard and technical supervision offices. But since there was a separate gated entrance between the area and the rest living quarter, this entrance was not an entrance to the community in the real sense. At last, there was a passage between the community and the adjacent working quarter near the nursery, which was also gated. Therefore, it can be said that there was only one entrance to the community from the outside, that is, the one on the north side.

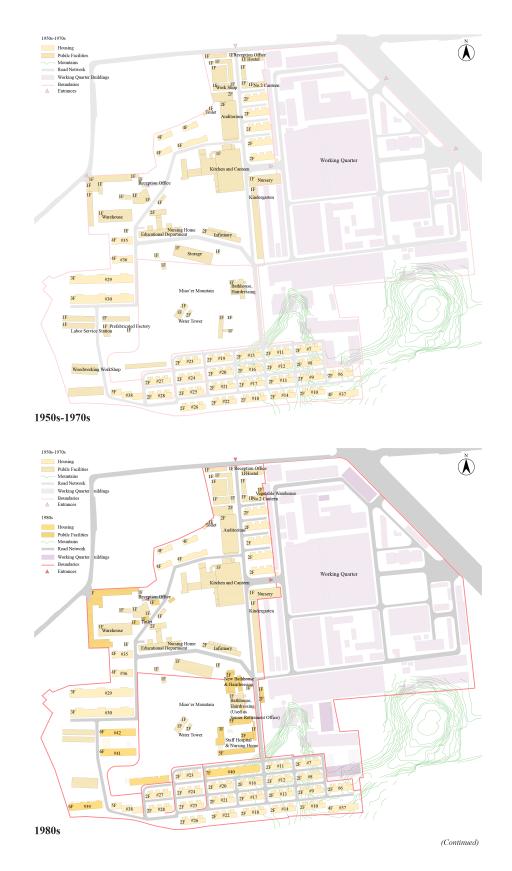


Figure 4-84 Redrawn site plans of #1XC in the 1950s-1970s, 1980s, 1990s and 2000s-2010s (Continued)

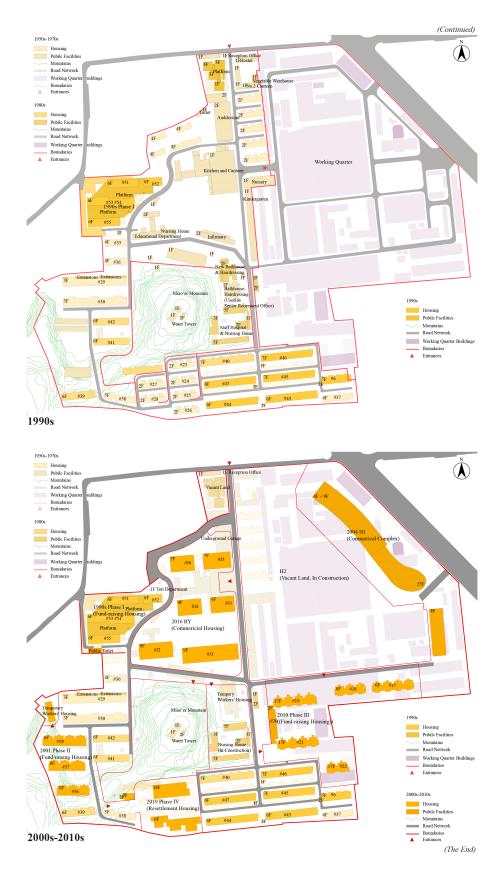


Figure 4-84 Redrawn site plans of #1XC in the 1950s-1970s, 1980s, 1990s and 2000s-2010s (The End)

Except for these three entrances and exits, most of borders of the community were enclosed by fences or walls. Only the two buildings located along the short boundary on the north side might be open to the outside. One of the two buildings was the hostel of the Factory. Judging from its function and its retreat to the city road, it should be indeed open to the outside at that time. The function of the other building was unknown, which should be a production-related building. It is difficult to infer whether it was open to the outside only by judging from the site plan. However, even if it was open to the outside, the overall physical connection between the community and the outside world was quite limited. It can be said that the whole community looked like a bag with a small opening and a big belly in the 1950s to the 1970s.

In the 1980s, there was basically no major changes in the boundary of the community, and most of the changes occurred within the community. Then in the 1990s, with the completion of two major public service buildings in the community, namely, the vegetable market on the basement level of phase I housing project and the kindergarten at the main entrance on the north side, physical connections between the community and the outside has been increased. On the one hand, with the completion of the vegetable market and phase I residential project, the original entrance located here began to be used by residents and thus became a real secondary entrance of the community. On the other hand, as mentioned earlier, the kindergarten was initially built for the children of the Factory's employees. But later, because there were few school-age children who need to go to a kindergarten in the families of the employees of the work-unit, the Factory introduced external funds and established a bilingual kindergarten there around 2003, which mainly enrolled children from the outside. As a result, the access control of the community has become much looser despite of its still enclosed boundary form.

The biggest change in the community's boundary occurred after the 2000s. In 2003, the adjacent working quarter moved away and buildings in it were rented out at the beginning, which resulted in the opening of the border on the east side of the community, that is, between the community and the original working quarter. Later, buildings in the original working quarter, as well as some buildings in the community, were all demolished for land acquisition, and the area became new development zones. Currently, the large area on the north side of the development zone is enclosed, waiting to be developed. However, this kind of enclosure is not the same as that of the original working quarter in any sense. For residents living in #1XC, they used to work in the working quarter and live in the living quarter. At that time, the boundary between the two quarters was only a formal separation. The close connection between the two areas could not be cut off by a wall. But the current wall of the development zone is a real division, and the original tie between the two areas is severely broken. From then on, the area on the other side of the wall, where they used to work, no longer belongs to residents of the community physically and psychologically.

In the meanwhile, the smaller area on the south side of the development zone was developed into a fund-raising housing project (Phase III) by the Factory around 2010, which accommodates employees of the Factory and belongs to #1XC administratively. But since it is an enclosed and gated area, it left the boundary of the Old Community here in a completely open state. Afterwards, a large number of public service buildings and some residential buildings in the community were demolished and replaced by a commercial housing project around 2016. Similar to phase III project, it is also an enclosed and gated area, and further destroyed the original enclosed boundary of the community. Last but not least, there is another gated area on

the south side of the community, that is, phase IV resettlement housing project completed in 2019.

In a word, after the relocation of the working quarter, which was once located on the east side of the community, a strong force from the east is gradually disintegrating the original border of the community. It broke the closed state of the community strongly, making it exposed to the outside. The boundary of the community gradually became blurred while shrinking to the west.

b. Traffic organization

It can be seen from Figure 4-84 that over the years, the road network in the community has not changed much and the traffic organization of the community is relatively free. It seems that the road is set up according to the layout of the building, ensuring that each building could be accessed directly, which is a highly practical traffic organization method. Overall, there are mainly three roads in the community in the 1950s to the 1990s. With the north-south road facing the main entrance on the north side as the main road, there were two other loop branch roads centered on public buildings- the kitchen and canteen, the educational department and nursing home, and the infirmary, and Miao'er Mountain respectively. They are connected together like a mirrored capital letter "B". After 2000, with the completion of those fragmented development projects in the community, the road network was only fine-tuned on the original one, and there were no major changes. But as the boundary of the community shrinks, some roads no longer belong exclusively to residents of the community, the north-south road facing the main entrance on the north side, for instance.

c. Architectural texture

Combining the previous analysis of the spatial evolution of the community at the building level, it can be found that the building density and the floor area ratio (FAR) of the community

had been both in a slowly increasing state before the official end of the national housing reform at the end of the 1990s. Overall, only those residential buildings in the small residential district on the south side of the community had a relatively dense and regular architectural layout, while the rest buildings were scattered and the concept of building clusters was not obvious. In addition, the number of floors of these early buildings was basically below 4 and there is also a small mountain in the community. As a result, the land use efficiency in the community was not high. From the 1950s to the 1990s, main changes happened in the community include the construction of three six-story residential buildings on the west side of Miao'er Mountain (building No. 39, building No. 41, and building No. 42), the replacement of the original two-story brick-wood houses in the southern part of the community by the six- or seven-story brick-concrete residential buildings (building No. 40 and building No. 43-47), the construction of phase I residential project and the vegetable market on its basement level, and the construction of the new two-story bathhouse and barbershop, the three- and five-story staff hospital and nursing home on the east side of Miao'er Mountain.

In contrast, the architectural layout change of the community after 2000 are much more obvious, while construction activities in the other two case work-unit communities basically stopped after the housing reform. Figure 4-85 shows the fragmented development of the community after 2000. These projects have been introduced in the introduction section of #1XC, so no more repetitiousness here. The focus here is the obvious changes that these projects have brought to the architectural layout of the community. To specify, the area of phase I was formerly occupied by a garden, a coal yard and technical supervision offices, which was a relatively sparse group of low-rise buildings. Phase I project, instead, consists of five six-story residential buildings and a large vegetable market on the basement level. Phase II area was



Figure 4-85 The fragmented development in #IXC after 2000

originally an air-raid shelter. Later, the hill there was leveled, and the air-raid shelter became the basement of phase II project. There are totally three six-story buildings in this project, plus the basement. As **Rs** described, phase II project was originally to be built on the north side of the current site after demolishing the few low-rise old buildings there. But some residents of these old buildings were reluctant

to move out, because they had no money to buy new houses and they did not have to pay for their current houses. Phase III project was originally occupied by some workshops in the

working quarter. It consists of two six-story and three seventeen-story residential buildings, making the FAR of the area very high. Phase IV project was built after demolishing the original six two-story brickwood buildings and there is one six-story and one sixteen-story buildings in it. Last but not least, after demolishing some public service

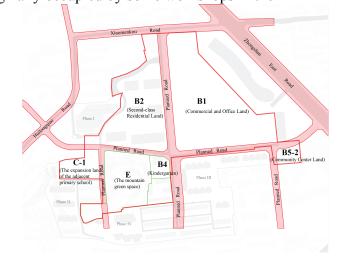


Figure 4-86 The optimization plan for the general layout of the B2 plot of the 3503 Factory in 2014

buildings and residential buildings in the original living quarter, RY was constructed as a commercial housing project by YT after purchasing the land use right from N3503, which includes four nine-story and two seven-story buildings. In fact, in 2014, Nanjing Bureau of Planning and Natural Resources has announced the optimization plan for the general layout of

the B2 plot of the 3503 Factory before approval. [Figure 4-86] As can be seen in the figure, B2 was planned as the second-class residential land, 18 which should be the original positioning of RY.

In summary, with the completion of these five projects, the overall FAR of the community has increased a lot after 2000 and the efficiency of land use has been significantly improved. But it must be pointed out that this fragmentated development has destroyed the community's original spatial structure and the area outside the scope of these projects are extremely dilapidated by comparison.

d. Public space

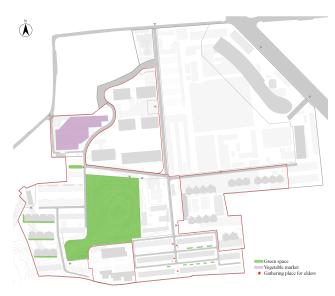


Figure 4-87 Locations of the public space in #1XC

The public space mentioned in this research mainly includes the green space and the open space. Similar to other two cases, because drawings obtained from the archive are mostly building-related, the depiction of the public space is relatively vague and missing. But according to the figure-ground relationship, it can be said that the change of the public space is inversely related to the

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¹⁸ According to the *Standard of Urban Land Classification and Planning Construction Land (GB 50137-2011)* issued by the Ministry of Housing and Urban-Rural Development of P.R. China in 2010, the first-class residential land refers to the low-rise residential land with complete public facilities, transportation facilities and public service facilities, and a complete layout and a good environment. The second-class residential land refers to the multiple-, medium- and high-rise residential land with complete public facilities, transportation facilities and public service facilities, and a relatively complete layout and a good environment. The third-class residential land refers to the land used in simple and crude residential areas that need to be renovated because of the incomplete public facilities and transportation facilities, the lack of public service facilities, and the poor environment, including the land occupied by dilapidated houses, shanty towns and temporary housing, etc.

building density in the community. That is to say, as the density of buildings increases in #1XC from the 1950s to today, the size of the public space naturally would shrink.

In the section of the administrative evolution, the green space in #1XC has been introduced briefly as proofs of the poorly management situation of the community after the Factory gradually withdrew from the community during the past two decades. [Figure 4-64] In the case of #1XC, there is no such a business street as the previous two cases, whether it is inside the community or along the border of the community. However, there is a large vegetable market on the west side of the community, which has been introduced in detail in the section of public service buildings at the building level. [Figure 4-82] The property right of the market belongs to N3503 and its entrance can also lead to the community directly, thus it can be counted as a public space of the community. In addition to the green space and the vegetable market, there are currently no obvious public squares in the community. However, there are indeed several gathering places for elders, which have been also mentioned in the section of the administrative evolution. [Figure 4-64, Figure 4-66] Therefore, only their locations in the community are shown here. [Figure 4-87] For detailed introduction and photos, please refer to the previous sections. On the whole, the distribution of the public space in the community is relatively balanced. To specify, with Miao'er Mountain as the center, four (five as of 2020) gathering places for residents are scatter, plus the multiple belt-shaped green space designed and constructed together with buildings. Relatively speaking, there is relatively better basic conditions for the improvement and transformation of the public space of the community.

In summary, before the national housing reform in the late 1990s, the four key factors at the community level, including boundaries, the traffic organization, the architectural texture, and the public space, were all in a slow and gradual evolutionary state. The construction and

renovation in the community were all limited to a fixed and enclosed boundary. The community at that time was a typical enclosed work-unit community. Residents can basically meet their daily life needs without too many connections with the outside. Since the end of the 1990s, with the end of the national housing reform, the housing in the community began to be privatized and can be traded freely in the market. In the meanwhile, a vegetable market facing the street on the west side and a kindergarten along the street on the north side had been successively built in the community and connections with the outside world have been gradually established through these two places. After 2000, especially after the relocation of the working quarter on the east side of the community in 2003, a series of fragmented real estate development based on the original working quarter and the area of public service buildings in the living quarter completely destroyed the original boundary of the community, both physically and psychologically. The range of the community has been squeezed to the west. Today, the area called the Old Community of #1XC only includes 15 residential buildings built before the mid-1990s and 8 buildings in phase I and phase II built around 2000. The atmosphere of the original work-unit community has been strongly destroyed. Against the backdrop of the three gated and enclosed districts and the commercial development area on the east side, the Old Community appears to be more and more withered. It can be said that today's #1XC is already in a quite open state, and it tends to be swallowed up by the surrounding development and integrated into the surrounding city, regardless of whether this integration is through being completely dismantled or being renewed and integrated in to the surrounding city.

Throughout the development of the community, it is not difficult to find that before the work-unit gradually withdrew from the management of the community, various factors inside the community, including the work-unit, residents, buildings, road network, borders, and the public

space, were all in a closed system and it had been developing steadily under the interactions of these factors. In this case, the community can be regarded as a self-organizing system with its own internal development power. With the removal and reorganization of the work-unit, the development of the community begun to become fragmented, which was mainly caused by N3503's real estate development based on the original working quarter and public service buildings in the living quarter. In principle, the company is the successor of the original work-unit and should be counted as an internal factor of the self-organizing system of the community. However, undoubtedly, all the later real estate developments after the end of the national housing reform have greatly increased the openness of the community.

3) City level

As described in previous two cases, the spatial morphological evolution at the city level can be treated as "non-specific interferences" from the outside. As far as we know, due to the overall planning and development of the city, plots, the road network and the public space surrounding the community may change accordingly. But the purpose of these changes is to serve the development of the entire city, not to interfere the community's development on purpose. But, of course, they may have a radiation effect on the development of the community. In this case, the spatial morphology around the community in the 1950s-1970s, 1980s, 1990s and 2000s-2010s were redrawn based on the collected data. [Figure 4-88]

As mentioned earlier, the boundary of the community has always been an irregular shape, which looked like a bag with a small opening and a big belly. Figure 4-88 shows the surrounding plots development of #1XC from the 1950s to the 2010s. In the 1950s to the 1980s, the community had only two connections with the city road, that is the main entrance from the Xiaomenkou Road on the north side and a formal entrance from Huilongqiao Road on the west

side. Except for these two entrances, the east side of the community was adjacent to its working quarter, the south side was adjacent to two other similar work-units, and the west side was surrounded by two other communities and a primary school. Then in the 1990s, the two work-units on the south side moved away and replaced by two communities. In the meanwhile, the building density was also slowly increasing in other surrounding plots. Thus, it could be said that the community had been tightly surrounded by these surrounding plots before the 2000s, and the direct spatial connection with the outside was quite limited.

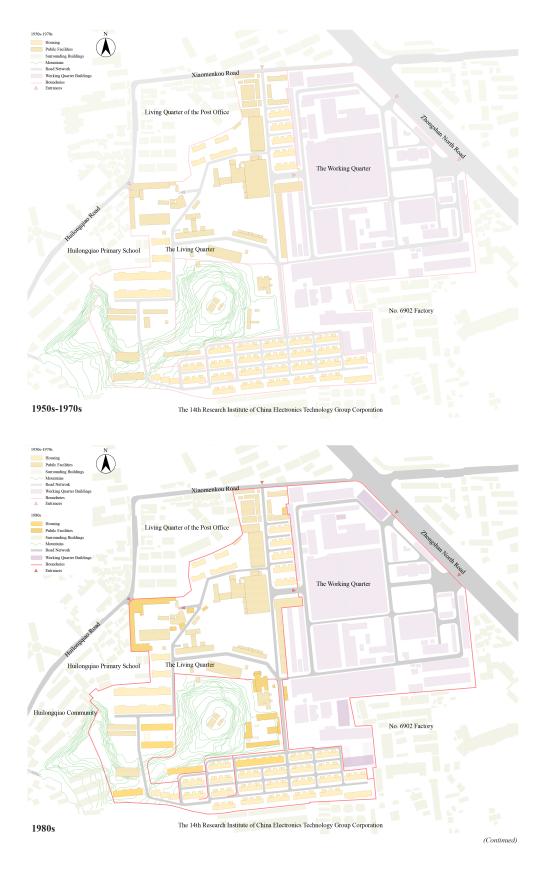


Figure 4-88 The spatial morphological evolution around #IXC from the 1950s to the 2010s (Continued)

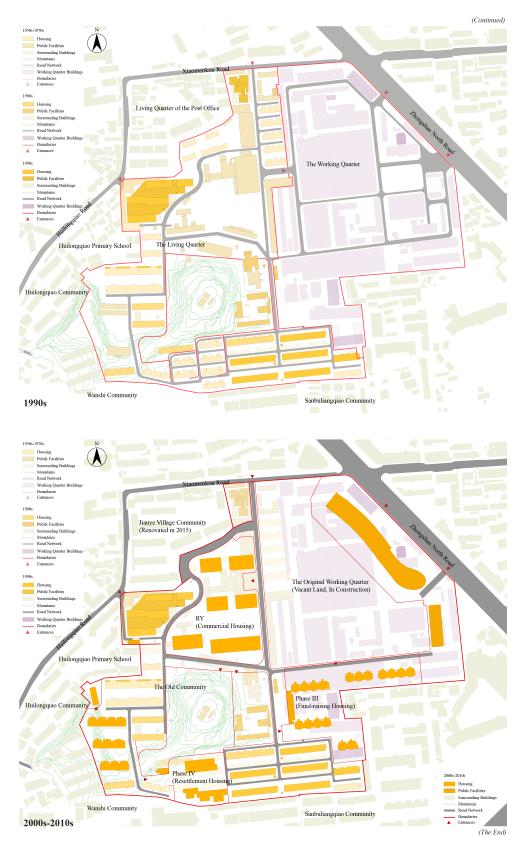


Figure 4-88 The spatial morphological evolution around #IXC from the 1950s to the 2010s (The End)

After 2000, especially after the working quarter on the east side moved away in 2003, a series of real estate development projects gradually opened the boundary of the community from the east side. But it is not difficult to find that the community is still surrounded tightly by the surrounding plots and its direct connection with the outside is very limited. However, it is worth noting that buildings in surrounding plots have been constantly updated. For example, the community in the northwest side of the community was rebuilt from the original Living Quarter of the Post Office around 2000. And in 2015, it has been renovated by the government. In a word, the development of surrounding plots of #1XC has been becoming more and more mature.

Due to limited data, only changes of several main roads that are very close to the community can be redrawn, including Zhongshan North Road on the east, Xiaomenkou Road on the north and Huilongqiao Road on the west. Among them, Zhongshan North Road was built in 1929 and it starts from Zhongshan Wharf in the northwest and reaches Gulou Square in the southeast. It is 5.5 kilometers long and 40 meters wide, spanning the entire Gulou District. And it has been an important urban road. Xiaomenkou Alley is at a 45-degree angle to Zhongshan North Road. *Xiaomenkou* means the school gate and the name came from the "Jiangnan Lushi School" that was built in the late Qing Dynasty here. Judging from Figure 4-88, the basic structure of these three surrounding roads has not changed much during the past 70 years. But it can be inferred that main changes have been the gradual expansion of roads and the improvement of road qualities.

At last, the development of the surrounding public space within a certain distance from the community has been also affecting the evolution of the community indirectly, including the newly appeared public service facilities, such as the commercial, educational, medical, sports and cultural facilities, and the newly emerging open space, such as the public square, parks, green space and business streets. Also, the newly added bus or subway lines can affect residents' modes of travel and lifestyle. All of these factors are driving residents of #1XC to walk out of the community to enjoy various public facilities in the city, which is a key reason why the community is becoming more and more open to the outside.

Same as the former two cases, the current distribution of different city-level factors surrounding the community within a scope of 1,200 meters (15 minutes by walking) and 800 meters (10 minutes by walking), including the surrounding road network, public service facilities and open space, will be drawn and illustrated, so as to prove the maturity of the surrounding city and its attractiveness to the community. [Figure 4-89]

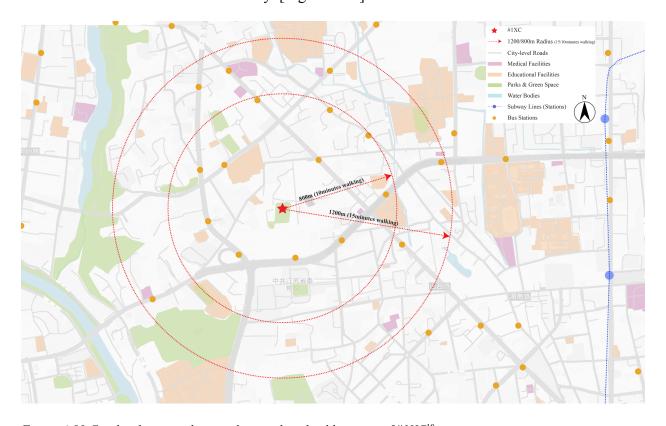


Figure 4-89 City-level surrounding road network and public space of #1XC19

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¹⁹ "Nanjing No. 1, Xiaomenkou Community _ Details of No. 1 Xiaomenkou | Second-Hand Housing | Rental Housing | Community Consultant (Nanjing Lianjia)." Accessed April 24, 2020. https://nj.lianjia.com/xiaoqu/1411046917317/.

As Figure 4-89 shows, the community is surrounded by four main city roads, but not directly connected to anyone. Therefore, bus stations are a little bit away from the community but there are bus stops within a 10-minute walking distance. Besides, there is no subway line passing through or near the two radius scopes. Thus, the distribution of public transportation facilities around the community is at a disadvantage when compared with the previous two cases. Unlike ISSC, #1XC is not a good school district housing (SDH), but its surrounding educational facilities are relatively rich, ranging from primary school to university. The surrounding medical facilities and green spaces are both at the average level. In a word, public facilities around the community are not so rich, but the situation is much better than before. All these public spaces nearby have been attracting residents in #1XC to merge and enjoy the city, instead of enclosing themselves in the community as before.

4.3.2 Conclusions

The official end of the national housing reform in the late 1990s, the reorganization of the Factory in 2010 and the arrival of the property management company in 2015 are deemed as the three key turning points in the evolution of #1XC. As described in Section 4.1, the working quarter of XNVC was moved away geographically in 2015. In the same year, a homeowners' committee was established, which eventually developed into a mature homeowners' self-governing management committee two years later and has signed a contract with a property management company. In #1XC, however, when the working quarter moved away in 2003, it was not until 12 years later (2015) that N3503 hired a similar property management company to deal with the parking issue in the Old Community. Thus, in #1XC, the relocation of the working quarter in 2003 was not deemed as a particularly critical turning point for the evolution of the community in this research, especially its administrative evolution. Based on the above analysis

of the administrative and morphological evolution of the community in the past decades, the following conclusions can be drawn.

- Like the previous two cases, the overall administrative evolution of #1XC is also 1) a process from simple to complex. Before 2000, the community was mainly managed by the work-unit and supplemented by residents. Then with the end of the national housing reform around 2000, almost all residents had purchased the property right of their own houses from the work-unit. The work-unit no longer directly managed these houses, and its strength of power in the management of the community had been greatly weakened. Instead, the new homeowners began to take responsibilities. Also, with the formalization of local government agencies, the work-unit began to transfer certain rights to the local government. Formal residents' committee was established, which can be said to be a subordinate agency of the local government in the country. Since then, the local government has become one of the important participants in the community's management. In the next 20 years, the strength of the power of each management party in the community has basically not changed much, except for the addition of a property management company in 2015. As for the social morphological evolution, the overall trajectory is similar to the previous two cases, which tends to evolve from single to complex, including the increasing complexity of residents and a mixture of property rights within the community. But the evolution of the spatial morphology of #1XC is different from the other two cases after the official end of the national housing reform in the late 1990s. Unlike Case 1 and Case 2, the construction of residential buildings in Case 3 continued after the reform, and the number is quite large.
- 2) Although the overall evolution trajectory of #1XC is similar to the previous two cases, it has certain unique characteristics. Administratively, with the end of the national housing

reform, the participation of the original work-unit in these three communities has been all greatly weakened. In #1XC, however, the work-unit in #1XC has been continuing to play an important role in the management of the community for the next 20 years. This is precisely because the original work-unit was reorganized in 2010, in which the original departments that were responsible for community-related matters was separated into an independent company and continued to undertake similar tasks. Morphologically, the construction of residential buildings in #1XC continued even after national housing reform around 2000, and the number is quite large, which leads to the fragmented spatial morphology of the community. In fact, it can be said that the uniqueness of the spatial morphology of #1XC is exactly caused by its unique administrative evolution.

- 3) Base on the physical performance in the Old Community of #1XC, the power of self-organizing in the community is no stronger than ISSC, especially the terrible condition of some old residential buildings in the community. As described earlier, a reorganized company has been in charge of the management of the community ever since 2010. Under normal circumstances, the management of the community should be good under the management of such a dedicated department. In fact, however, the company is far more interested in the real estate development than in maintaining the Old Community.
- 4) Similar to the previous two cases, the overall evolution trajectory of #1XC is also an "un-gating" process. Like them, the surrounding urban development of #1XC is also becoming more and more mature, and the accompanying construction and improvement of various supporting urban facilities are attracting residents of the community to go out and merge into the city. Also, the more and more complicated population composition in the community is promoting the merge of the community into the city. But compared with the previous two cases,

the degree of openness of #1XC is much higher, especially the spatial one. Based on the above analysis, it can be said that today's #1XC is already in a quite open state, and it tends to be swallowed up by the surrounding development and integrated into the surrounding city, regardless of whether this integration is through being completely dismantled or being renewed and integrated in to the surrounding city. And the main reason for the merge is that N3503 focuses more on the real estate development. However, it must be clarified that whether the real estate development path is good or bad for the community is still inconclusive. There are reasons to believe that the work-unit's choice of the real estate development path should be a decision after comprehensive considerations of various factors. Perhaps relevant departments believe that the Old Community has no retained value and will eventually be swallowed up by the surrounding real estate development. Perhaps in the context of the surrounding new market development, the relevant departments will deem the Old Community has significant historical value, and thus renovate it, making it reborn. And only time can give the answer. Until then, to maintain the good operation of the community and its self-organizing environment, residents should be the main force in the management of the community.

5) There are many traces of self-organizing evolution in #1XC. At the building level, for example, through the analysis of building No. 29 and building No. 30, it can be found that the building structure in the community has a change from brick-wood structure to brick-concrete structure. This is the embodiment of residents' increasing needs for the safety and solidity of the building. Also, in building No. 29, partitions added by residents themselves are reflections of their pursuit for security and privacy. At the community level, the scattered gathering space built by residents with simple materials and the stools and chairs there are all good manifestations of the inner self-organizing force in the community. While residents are using their own way to

improve the living environment of the community, the behaviors of other departments also reflect the self-organizing power of the community. For instance, to improve the spatial environment of the Old Community and the living environment of residents, Residents' Committee of H Community funded and constructed two new wooden rest pavilions, installed charging piles for the non-motor vehicle parking sheds in phase I residential area, and called on residents to empty those illegal storage rooms in the Old Community. Also, to improve residents' living environment, N3503 has renovated the vegetable market and the staff hospital in the community. On December 2, 2020, the company also published an announcement stating that they are going to repair these old residential buildings in the following days, which is actually a response to requests from residents. In a word, behaviors of residents, residents' committee and N3503 are all manifestations of the power of the self-organizing in the community, despite of the fact that the physical performance of the community is still very bad.

During the field investigation, it is found that many residents, especially those living in old residential buildings like building No. 29 and building No. 30, hope that the old buildings in the community can be demolished and rebuilt. But in view of the current situation of the community, it is more practical to carry out some micro renewals and transformations in the community. Also, compared with the previous two cases, the distribution of greening in #1XC is indeed the least. But it has a unique innate natural resource, that is, Miao'er Mountain, which is located in the middle of the community. Also, there are several gathering space spontaneously formed by residents in the community. Compared with Case 2 (ISSC), the public space in #1XC owns a basic framework. Therefore, #1XC has a certain basis for retrofitting. In order to make the community run well, relevant departments, including N3503 and Residents' Committee of H Community, on the one hand, can learn the experience of Case 2 (ISSC). To specify, a

professional property management company can be introduced into the community first under their leadership. Then after a period of trial operation, a formal homeowners' committee can be established, and residents can become the main participants in the management of the community. On the other hand, before that, the company and the residents' committee need to communicate more and cooperate better. They should clarify their respective responsibilities, ensuring that everything in the community is taken care of. In the meanwhile, they should actively call on residents to participate in the improvement of the living environment of the community, which can be the foundation for the establishment of the formal homeowners' committee in the future.

4.4 Conclusions

In accordance with the same analytical framework, this chapter gives a detailed explanation of the evolution of the three work-unit communities in the past decades in Nanjing, including the administrative evolution and the morphological evolution. Next is a simple comparison and summary, which will be further elaborated in Chapter 6.

To sum up, in terms of the administrative evolution, during the past decades, the administrative organization of the three cases has shown a trend from simple to complex. To simplify, before the end of the national housing reform in the late 1900s, their respective work-units were managing the community to a large extent. Later, different role players began to participate in the management of these communities, and the three cases all had their own unique ways of administrative evolution after the housing reform. In fact, their different administrative evolution trajectory has led to their different spatial morphology. As to the morphological evolution, the social and spatial morphological evolution of the three cases were mainly studied in this research. Through comparisons, it can be found that the social morphological evolution of

the three cases is basically the same. The population composition and property rights in the community have been gradually complicated with the end of the national housing reform. And as mentioned above, the different administrative evolution in the three cases has led to their different spatial morphological evolution. Overall, the physical performance of Case 1 (XNVC) is the most satisfactory. Case 2 (ISSC) was once disappointing in the management of the public space, but the situation has been gradually improved with the entry of a professional property management company in August 2020. Case 3 (#1XC) is a special one. The surrounding and internal real estate developments have brought a violent impact to the original work-unit community, and the public space and old buildings in the Old Community are lack of special maintenance. The future of the community is still uncertain, but it is necessary to retrofitting it in the near term based on its current situation.

Last but not least, this chapter only briefly explains the self-organizing evolution of the case work-unit communities in some paragraphs. The following chapters, Chapter 5 and Chapter 6, will give specific explanations on the self-organizing evolution and retrofitting of the work-unit community.

Chapter 5. The Analysis of the Self-Organization Theory

Self-organization theory is a system theory developed on the basis of "General System Theory". It mainly studies the formation and development mechanism of complex self-organization systems, such as the life system and social system. Modern science believes that self-organization theory is not only applicable to the "natural" world, such as physics, chemistry, biology, and physical geography, but also can explain social and economic phenomena well. In the economic field, self-organizing economics has appeared. Urban self-organization research, self-organization sociology, self-organization interpretation of historical phenomena, and other related disciplines have emerged one after another, which indicates that self-organization theory, as a natural epistemology and methodology, has universal applicability significance.²

In this study, self-organization in a work-unit community mainly refers to the evolution of both the intangible social morphology and the tangible spatial morphology, which were brought by the continuous coordination and communication among the main participants in the community management, including the work-unit, homeowners' committee, residents, the street office and residents' committee, property management company and other relevant organizations. Through nonlinear interactions among different subsystems in the work-unit community system, rather than forced interventions by external forces, the work-unit community has been spontaneously evolving in its own way during the past decades. While explaining the self-organization theory, the primary characteristics and types of action being taken in the

¹ Liu, Wei. "Institutional Change of Self-Organization in Residential Area Regeneration (in Chinese)." Doctoral Dissertation, Chongqing University, 2016.

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² Yuan, Xiaomeng. "Self-Organization Theories of Urban System (in Chinese)." Doctoral Dissertation, Northeast Normal University, 2006.

evolution of the three work-unit community cases described in Chapter 4 will be briefly illustrated next.

Since the 1940s, with the system theory being widely used in various disciplines, scientists have discovered a lot of self-organization phenomena. From the late 1960s to the 1970s, based on the research on the self-organization phenomenon of complex systems, several theories that study the system evolution have been born successively, including the "Dissipative Structure Theory" created by I. Prigogine et al., the "Synergetic" created by H. Haken et al., the "Catastrophe Theory" created by R. Thom, the "Hypercycle Theory" created by Eigen et al., and the "Fractal Theory" created by B. B. Mandelbrot, the "Chaotic Theory" created by E. N. Lorenz et al.^{3, 4, 5, 6} Later, with the expansion of the research scale and field, the self-organization theory surpassed the scope of nature and science and rose to the height of philosophy, transforming into the self-organization methodology, which makes its application in the field of architecture possible. Among those scholars, Chinese philosophers of natural science Wu Tong also carried out relevant researches on the self-organization theory at the philosophical level and tried to apply it to explain nature and science. The Research on Self-Organizing Methodology published by Wu Tong provides an important reference for learning and summarizing relevant knowledge of self-organization theory in this research.

As Wu descried, the founder of the "Dissipative Structure Theory', Ilya Prigogine and his colleagues first accurately proposed and used the concept of "Self-Organization" when

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³ Wu, 2001.

⁴ Cai, Hua. "Research on Heilongjiang City System Evolvement and Development based on Self-Organization Theory (in Chinese)." Doctoral Dissertation, Harbin Engineering University, 2006.

⁵ Qi, Weiqi. "A New Method: Urban Design Compatible with Self-Organization (in Chinese)." Doctoral Dissertation, Tongji University, 2006.

⁶ Yi, 2013.

establishing the theory. They used the concept to describe the process of spontaneous occurrence or formation of ordered structure, which accurately captures the essence of the spontaneous occurrence of ordered structure of Benard convection.^{7, 8}

The founder of "Synergetic", H. Haken, first clarified the differences between "Organization" and "Self-Organization' in our daily life. In his book, Haken uses a simple example to illustrate these two concepts. As he described, if a group of workers act in a well-defined way on given external orders, i.e., by the boss, then this process could be described as organization or, more exactly, organized behavior. However, for the same group of workers, if they work together by some kind of mutual understanding without external orders given, the process then could be called as being self-organized. Later, he introduced the definition of self-organization in another book, which is more acceptable and recognized in the self-organizing discipline. As he described, "We shall say that a system is self-organizing if it acquires a spatial, temporal or functional structure without specific interference from the outside. By 'specific' we mean that the structure or functioning is not impressed on the system, but that the system is acted upon from the outside in a nonspecific fashion." Like Wu, the author also deems that Haken's definition of self-organizing is accurate, thus it is adopted in this study.

However, while admitting the accuracy and universality of Haken's definition of selforganization, Wu has a second thought about Haken's classification about "Organization" and

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⁷ Wu, Tong. "Outline for Self-organizing Methodology." *Journal of Systemic Dialectics*, no. 02 (2001): 4–10.

⁸ Nicolis, G., and Prigogine, I. *Self-Organization in Nonequilibrium Systems: From Dissipative Structures to Order through Fluctuations*. New York: Wiley, 1977.

⁹ Haken, H. *Synergetics: An Introduction: Nonequilibrium Phase Transitions and Self-Organization in Physics, Chemistry and Biology.* 3rd rev. and enl. Ed. Springer Series in Synergetics; v. 1. Berlin; New York: Springer, 1983.

¹⁰ Haken, 1988.

"Self-Organization". In his opinion, it is inappropriate to think of "Organization" and "Self-Organization" as two concepts of the same level. Instead, the latter should be a second-level concept of the former and correspond to "Organized". While in Haken's description, "Organization" equals "Organized", Wu deems that "Organization" should correspond to "Non-Organization", and "Self-Organization" and "Organized" are two second-level concepts for the former, just as "Self-Disorder" and "Disordered" for the latter. Besides, Wu argues that Haken's indiscriminately adoption of "Self-Organization" or "Self-Organizing" to represent one object's evolution from "disorder" to "order" is not proper. As a non, "Self-Organization" refers to the orderly existence of certain extant things, which is a way of being and must be a system. "Self-Organizing", as a verb, on the other hand, should be one object's evolution towards an orderly structure of space, time or function. In other words, "Self-Organization" is a result while "Self-Organizing" is a process. In this study, Wu's definition of these terms will be adopted.

As mentioned in Section 1.5, in related disciplines, the generally accepted view is that self-organization theory is not an independent theory, but a group of different theories, which include the "Dissipative Structure Theory", the "Synergetic", the "Catastrophe Theory", the "Hypercycle Theory", and the "Fractal Theory" and the "Chaotic Theory". Despite of their differences on research objects, they do share one common feature, that is, they all work on the nonlinear complex system or the nonlinear complex self-organizing process. Each theory is actually a methodology, however, as a whole, there should be a unified self-organizing methodology that links them together.¹²

5.1 Dissipative Structure Theory

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¹¹ Wu, 2001.

¹² Wu, 2001.

In the early 1990s, when these theories were introduced to P.R. China, Wu et al. have clarified the role of each theory played in the whole self-organizing methodology. As they concluded, "Dissipative Structure Theory" studies the necessary conditions to construct a self-organizing system, including moderate openness, nonlinear, far from equilibrium, and fluctuations. In their book, Prigogine and Stengers said:

We now know that far from equilibrium, new types of structures may originate spontaneously. In far-from equilibrium conditions we may have transformation from disorder, from thermal chaos, into order. New dynamic states of matter may originate, states that reflect the interaction of a given system with its surroundings. We have called these new structures *dissipative structures* to emphasize the constructive role of dissipative processes in their formation.¹³

The four basic elements covered by Prigogine's dissipative structure theory are mentioned here, namely, moderate openness, nonlinear, far from equilibrium, and fluctuations. Next, the author will briefly explain them one by one. Afterwards, by corresponding to the research object of this study- the work-unit community system and interpreting whether the system owns these four basic elements, it can be determined whether the work-unit community system can be judged as a self-organizing system.

a. Moderate openness

Openness is a necessary condition for one system to exchange material and energy with the outside world. It is also a prerequisite for the interaction between systems and subsystems: each system responds to the input and outputs to other systems as new inputs.¹⁴ It thus can be seen as an external condition required for a self-organizing system. Regarding the openness of urban residential areas, some Chinese researchers have already had relatively mature

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¹³ Prigogine, I., and Stengers, Isabelle. *Order out of Chaos: Man's New Dialogue with Nature*. 1st ed. Boulder, CO: New Science Library: Distributed by Random House, 1984.

¹⁴ Yi, 2013.

explanations. For instance, from the perspectives of natural environment and social environment, Yi explained that the openness of the existing city residential system is self-evident. As he describes in his thesis, since the building is built in the natural environment, subsystems at all levels of the residential area are inevitably directly affected by it. In turn, the latter changes the natural environment through the release of energy and information, such as the destruction of building pollution to the natural environment, the occupation of the natural environment by the building entity, and the feedback of artificial greening to the natural environment. Secondly, the dynamic behavior of people contributes to the interconnection between the residential system and the society. While the residential area itself exists in a physical state, human beings are the carriers of energy and information, which not only connects the interior of the residential system, but also makes the connection between the system and the outside world inevitable. The socalled economic, social, cultural and other factors that affect the residential areas are realized by people.

In addition, Zhou mentions in his thesis that a community is a complex and giant system with multiple subsystems and multiple levels. Its openness is mainly manifested in two aspects. On the one hand, the community must be open to maintain the basic physiological needs of residents. Urban community need to constantly introduce food, water, electricity and other basic living guarantees from the outside world in the form of barter or currency transactions. On the other hand, the openness must be moderate. If the community is completely open, which means that there is no boundary between the community and the external environment at all, then the community is disintegrated and disappeared. Thus, there must be a boundary for a community,

¹⁵ Yi, 2013.

which filters, isolates and standardizes the material, energy, information of the input and output of the community.¹⁶

Judging from the past nearly seven decades of the evolution of the three work-unit community cases in this study, it is noticeable that the work-unit community as a whole have experienced a process of gradually opening. Specifically, from the beginning, they were completely isolated from the city by walls and gates physically, and then they have been gradually integrating into the city with the removal of partial walls and the increasingly fictitious access control of the community. In the meanwhile, as the composition of residents gradually becomes more and more complex, as carriers of information and energy, residents themselves are also effectively promoting the gradual opening of the community socially. And it is noticeable that in such a gradual opening process, as a part of the city, these work-unit communities have always been exchanging material, energy and information with the outside world, including the natural environment and social environment. However, even today, those existing work-unit communities still retain their own certain degree of closure, not 100% open to the outside world, the most obvious sign of which is the retained physical boundaries around the community. Therefore, it can be said that the three work-unit community cases are fully equipped with the moderate openness required by a self-organizing system.

b. Nonlinear

Nonlinear interaction is the internal driving force for the evolution of a self-organizing system. As Wu describes in his book, if a system is a linear system, it basically precludes the possibility of a dissipative structure and only a nonlinear system can evolve into an ordered

¹⁶ Zhou, Ju. "Research on Form of Community Renewal Based on Self-Organization Theory- A Case of Shenzhen Huaide Community (in Chinese)." Master's Thesis, Southwest University of Science and Technology, 2013. http://xueshu.baidu.com/usercenter/paper/show?paperid=d4172bba8a1aba507455de361e60f11e&site=xueshu_se.

dissipative structure system.¹⁷ Yi makes a simple distinction between linear and nonlinear systems in his thesis. As he states, in a linear system, individuals act independently and are independent of each other, and the sum of the system's actions is equal to the algebraic sum of individual actions. In a nonlinear system, the state presented by the system through the sum of the nonlinear actions of the subsystems makes the individual actions of subsystems no longer independent, that is, the sum of the nonlinear actions of subsystems is not equal to the algebraic sum of each individual action. On the other hand, the same nonlinearities may produce order from the chaos of the basic process, or they may become the cause of the disruption of the same order in different environments, and ultimately produce a new consistency outside of another bifurcation.¹⁸

Yi further explains the nonlinear actions in the existing city residential area. As he said, the natural environment, people and buildings are organically combined together, and their mutual relationships are nonlinear. To specify, when people have certain behavioral needs, they will transform buildings by changing the environment, which will in turn affect and restrict the natural environment and people's behavior. The environment is the basis of the existence of people and buildings: the change of any one of the three will lead to the overall change.

With reference to studies of these scholars, combined with the analysis of the three work-unit communities in this study, it can be concluded that existing work-unit communities meet the nonlinear requirement of a self-organizing system. As described earlier, through nonlinear interactions among different elements, both the intangible social morphological and tangible

¹⁷ Wu. 2001.

¹⁸ Yi, 2013.

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spatial morphological ones included, rather than forced interventions by external forces, the work-unit community has been spontaneously evolving in its own way during the past decades.

c. Far from equilibrium

Being far from equilibrium is a necessary prerequisite for the evolution of a selforganizing system. Wu mentioned in his book, "The concept of self-organization, as a philosophical abstract concept of evolution, contains three types of processes: first, from nonorganization to organization; second, from a low degree to a high degree of organization; third, from simple to complex at the same level." 19 Yi briefly explained the difference between equilibrium, near equilibrium and far from equilibrium in his thesis. The author deems the illustration is relatively clear and easy to understand, so Yi's argument is quoted in this research. As he mentions:

When the system is in an equilibrium state, it will move towards a lower level and disorder as the entropy increases. When the system is in a linear region near equilibrium, no matter what the initial conditions are, the system will eventually reach a state determined by the external boundary conditions.

Different from the equilibrium state and near equilibrium state, far from equilibrium means that measurable physical properties in the system are extremely uneven. In this region, the system may still evolve to a certain steady state, but its behavior may be very different from the behavior predicted by virtue of the principle of minimum entropy production, even opposite actually, towards a state of macroscopic order produced by high entropy. And this is exactly what Prigogine called "nonequilibrium is the source of order"20.21

²⁰ Prigogine, I., and Stengers, Isabelle, 1984.

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¹⁹ Wu, 2001.

²¹ Yi, 2013.

In a residential system, on the one hand, nonequilibrium is the result of the feedback of the nonlinear interaction between buildings, between people and between people and buildings.

On the other hand, nonequilibrium drives these relationships from simple to complex.

As for a work-unit community system, the nonequilibrium state between the lag of building function layout, community infrastructure, etc. and the increasing living demands of residents has become the main power source for the continuous renewal and evolution of the work-unit community system. For instance, at the residential building level, with the improvement of residents' living standards, the demand for private bathroom and kitchen space has led to the expansion and transformation of old housing units. The pursuit of living room, the need for larger living space and the higher living comfort requirements contributed to the construction of larger housing units in the later period. As for some original public service facilities in the work-unit community such as kitchen and canteen, bathhouse, boiling room, hostel and auditorium, as the residents' lifestyle changes, these buildings have gradually lost their original use value, and finally a balance will be achieved as they were demolished, or their functions were replaced. At the community level, the prevalence of private cars requires more parking space, and the change of residents' lifestyle requires more public square and green space. The aging of residents promotes the addition of elevators. In the meanwhile, with the complexity of residents and the increasing maturity of urban infrastructure construction, residents need to have more intersections with the city. Also, some reconstructed public buildings in the work-unit community, such as kindergartens and hospitals, are also attracting people from the outside. The original self-enclosing property of work-unit communities is no longer suitable. Many of the existing work-unit communities' access control systems are in fact open to everyone and they are gradually integrating into the surrounding city. In this way, under the nonlinear interactions of

various factors, the work-unit community gradually become ordered and complex, that is, nonequilibrium is the source of order.

d. Fluctuations

Fluctuations will lead to the orderly evolution of a system. As Wu described in his book:

Fluctuations are the trigger for the emergence of the dissipative structure. But when the fluctuations will occur is unpredictable. We can only give a rough description of the stages and their meanings of fluctuations. If fluctuations appear in the near equilibrium region where the system has just deviated from the equilibrium state, then it may not be constructive for the system to evolve into a dissipative structure. Only when they appear in the region that is far from the equilibrium can they play the role of establishing the trigger of the dissipative structure. Besides, the emergence of Chaos Theory makes us realize that there are deterministic internal fluctuations within the system, and this kind of internal fluctuation is eternal ²²

It can be seen that the significance of fluctuations is to increase the amplitude of the nonequilibrium of the system by partially amplifying the existing nonequilibrium state of the system. Through the amplifying and triggering effect of fluctuations, quantitative changes may cause qualitative change. The original stable network structure will collapse, thus generating a new and high-level advanced community context. Last but not least, Fluctuations are divided into external fluctuations and internal fluctuations. As the name implies, the internal fluctuation comes from the internal actions of the system while the external fluctuation is the opposite. For example, "The water temperature is already below the freezing point, and the water should have turned to ice long ago. It is in a so-called metastable state without freezing. A spontaneous fluctuation, or a small shock from the outside, would make the water suddenly turn into the ice." 23

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²² Wu, 2001.

²³ Haken, H. *Synergetic: The Mystery of Nature (in Chinese)*. Translated by Fuhua Ling. Shanghai: Shanghai Translation Press, 2005.

For the work-unit community, there are always deterministic internal fluctuations within the system, and at the same time it is experiencing intermittent external fluctuations, such as the disintegration of the work-unit system and the community management mode changes and some other relatively drastic changes. In this case, the community must maintain the dynamic balance of the community through continuous changes and the three cases in this study have different coping strategies. To specify, Case 1 (XNVC) has successfully responded to these fluctuations in a relatively short period of time through the establishment of homeowners' self-governing management committee and the dedicated support of the residents' committee. Thus, the evolution of the community has always been maintained in a relatively stable state. The response of Case 2 (ISSC) is slower than that of Case 1, but after some explorations, it also has found the suitable coping strategies. It is believed that the community will also find its own equilibrium in the near future. Finally, the community system in Case 3 (#1XC) has been undergoing rapid changes in various internal and external factors during the past few decades, especially the intervention of private developers and the secondary development of the original work-unit land. All of these factors have magnified the nonequilibrium of the community and its stability has been destroyed. When fluctuations reach the critical value of the steady state of the community, it may lead to the disintegration of the community or the formation of a new higher order in the community. If the community is unable to make timely and effective responses, these fluctuations are excessive for the community.

5.2 Synergetics

Synergetics, which was born almost at the same time as the dissipative structure theory (perhaps a little earlier than the latter, 1971-1976), was an interdisciplinary theory founded by the West German scientist Hermann Haken at the time. Haken defines the research category of

synergetics in his book: "Synergetics deals with systems composed of many subsystems, which may be of quite different natures, such as electrons, atoms, molecules, cells, neurons, mechanical elements, photons, organs, animals or even humans. In this book we wish to study how the cooperation of these subsystems bring about spatial, temporal or functional structures on macroscopic scales."²⁴

As Wu described in his book (2001), "Synergetics" can be regarded as a dynamic methodology in the self-organization theory methodology group, which focuses on how the self-organizing system itself maintains the vitality. The important concepts and principles that the theory studies, such as competition, coordination, slaving and order parameters, all have important guiding significance for the evolution and advance of the self-organizing system. As Haken described in his book:

...the exchange of information may initially occur at random, a competition or cooperation between different kinds of signals sets in, and eventually a new collective state is reached which differs qualitatively from the disordered or uncorrelated state present before. Thus, a new state is described by an order parameter or a set of order parameters or equivalently by one or several informators. The states of the individual parts are determined by means of the slaving principle...²⁵

From the perspective of Synergetics, subsystems are the microcosms of the system, and the interaction of the subsystems leads to the overall behavior of the system. The internal motivation of the system to realize self-organization is mainly related to the following basic concepts.

a. Competition and cooperation

In Haken's various work on synergetics, competition is the basic prerequisite and

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²⁴ Haken, H. *Advanced Synergetics: Instability Hierarchies of Self-Organizing Systems and Devices*. Berlin, 1983. http://hdl.handle.net/2027/mdp.39015011177741.

²⁵ Haken, 1988.

condition of synergy. Wu also mentions in his book that competition is the most active driving force for the evolution of a system. And he further explained that "the competition of the internal elements of the system or between the systems is the perpetual. Although the competition can be large or small, strong or weak depending on the conditions, due to the eternity of the movement, the difference between the various subsystems within the system is eternal. Thus, the existence and evolution of the competition are also eternal." ²⁶ In addition, due to the different adaptation and responses of various elements or different systems to the external environment and conditions, the quality of the acquired matter, energy and information is also different, so there must be competition. From the point of view of the evolution of an open system, this kind of competition, on one hand, creates the conditions for a self-organization evolution, that is far from equilibrium (or at least contributes to this evolution condition). On the other hand, it promotes the evolution of the system towards an orderly structure.²⁷

The concept of cooperation also plays an important role in synergetics. The so-called cooperation, according to Haken, is the coordinated, cooperative or synchronous joint action and collective behavior of many subsystems in the system. Cooperation is the internal manifestation of the integrity and relevance of the system.

In short, competition makes the system tend to be nonequilibrium, which is the primary condition for the self-organization evolution of a system, while the cooperation between subsystems unites and amplifies certain movement trends in the subsystems under the

²⁶ Wu, 2001.

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²⁷ Shen, Xiaofeng, Wu, Tong, and Zeng, Guoping. *Self-Organizing Philosophy- A New View of Nature and Science (in Chinese)*. Series of Studies on the Frontier Issues of Contemporary Philosophy. Beijing: Central Party School Press, 1993.

nonequilibrium condition, thus making them occupy the dominant position and dominate the evolution of the whole system.

For the work-unit community in this study, competition and cooperation have always existed during the evolution of the past few decades. For instance, in a building, with the change and improvement of residents' living needs, different functional spaces will compete and cooperate with each other, and each one may become the main body of the overall space of the building at a certain point in time. For example, housing units that were built in the 1950s and the 1960s were basically dominated by the bedroom space, and individual kitchen, toilet and hall were all in an accessory position. Later, with the improvement of people's living standards, the demand for private kitchen and bathroom, and the hall has become more and more intense. This has led to the expansion of some old buildings. Many original kitchen and toilet spaces have merged into the hall and the new extensions has become the new private kitchen and bathroom.

At the community level, there are similar competitions and cooperation. For instance, in XNVC, since around the 2000s, with the prevalence of private cars, the parking issue in the community was chaotic and disordered at the beginning. Car owners would follow the principle of "first come, first served", and whoever grabs the vacant space was the "winner". Later, under the coordination of the work-unit, residents, and the property management company, the common parking principles might be formulated, and the parking space was designated in the community. For another example, in the past few decades, with the increase of the number of residents in the community, the demand for more living space is increasingly enhanced. Under the leadership of relevant departments of the work-unit, a lot of new residential buildings have been built, which undoubtedly had occupied part of the original open space, and part of the original road network had also been changed accordingly. Here, there are competitions for space

among the buildings, public space, which have finally achieved a stability and equilibrium under the cooperation among them.

b. Order parameter and slaving principle

Order parameter and slaving are two central concepts of synergetics. In short, the order parameter is the product of competition and cooperation among a large number of subsystems within a system, which in turn slaving the behavior of subsystems and the overall behavior of the system, thus generating new order parameters and promoting the self-organization evolution of the system.

In Haken's opinion, no matter what the system is, if a parameter changes from nothing to something during the evolution of the system and can indicate the formation of a new structure, and reflect the order degree of the new structure, it is then an order parameter. But it must be clarified that the order parameter is not a dominant subsystem in the system, but a parameter of the order degree of the macroscopic overall pattern of the collective movement of a large number of subsystems.

Wu uses the example of dancers in his book to illustrate these two concepts. He mentioned that if there are many people dancing on a limited dance floor with no one directing, the order on the dance floor must be chaotic at first, and everyone will bump into each other.

Later, some people will find that as long as they dance in the same direction as the person next to them, there will be no collision. This kind of behavior will gradually expand to form an order on the dance floor: everyone rotates around the center of the dance floor in a certain direction. The formation of this pattern is the order parameter that governs all the dancers, and this order parameter, formed through the interaction of the dancers' spontaneous behavior, once formed, will dominate in turn the behavior of dancers. The dancers have to serve the rule that they have

gradually formulated through the interaction of subsystems in the dance movement, regardless of whether the rules are right or wrong. Unless, the old rules are abolished collectively through great fluctuations and new rules are reenacted.²⁸

5.3 Catastrophe Theory

"Catastrophe Theory" is a topological mathematical theory proposed by French mathematician Rene Thom in the late 1960s. It is an emerging discipline that studies the phenomenon of discontinuous sudden changes of the system. In Wu's book, it is deemed as a methodology of evolvement approach in the self-organization theory methodology group, which studies the possible paths adopted by the self-organizing system in its evolution. Concepts of critical points, catastrophe and gradual change, as well as structured approaches to problem solving, concerns about conflicts, the interpretation of the contradictory relationships between action and understanding all have important methodological implications.²⁹

Thom analyzes the concept of catastrophe from two perspectives: the ordinary meaning and the meaning according to Catastrophe Theory. He deems that when the control variable is close to the critical point, the control variable jumps away from the critical point, and the system structure is destroyed and irreversibly gives way to another system, which is a catastrophe in the ordinary sense. If the control variable is far away from the critical point, the structure of the system is not destroyed, but a change that pushes the system forward, so that the system is retained. Then such a catastrophe is a catastrophe in the Catastrophe Theory sense, and this one is the means for the system's success survival and evolution.³⁰

²⁹ Wu. 2001.

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²⁸ Wu. 2001.

³⁰ Zhou, 2013.

Thom uses an S-shaped curve to better illustrate the catastrophe in the Catastrophe Theory in his book. As he described in the book:

Let us consider now the case where the characteristic (Γ) has the appearance of an S-shaped curve. [Figure 5-1] Again, in this case we have two points with vertical tangents a, b: the *critical points* as we shall see later. Let us take a value u_0 in the interval [a', b'], and let us suppose that the value y_0 corresponding to the input u_0 is such that the point (u_0, y_0) is situated on the lower branch of the curve. In this case if we make u increase from u_0 , such that u < b', we will be able to follow by continuity the local solution defined by $y = \varphi(u)$. If now we push u beyond the value b' the system is no longer necessarily destroyed, the internal state can jump sharply on to the higher branch to the point (b', b_1) and from there continue to grow on the higher branch. This sharp jump which permits the system to subsist when it would normally cease to exist we shall call 'a catastrophe (under the meaning according to Catastrophe Theory)'. The 'catastrophe' is thus a 'survival manoeuvre' of a system called on to leave its normal characteristic state. It is thus that the benign appearance of the 'catastrophes' of Catastrophe Theory are manifest.³¹

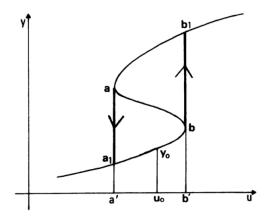


Figure 5-1 Catastrophe Theory (Source: from Thom, 1983.)

a. Catastrophe and gradual change

In his book, Wu questioned the traditional empirical understanding of the difference between catastrophe and gradual changes, that is, a slow change is a gradual change while an obvious rapid change that is completed instantly is a catastrophe.

He believes that the essential difference between the catastrophe and gradual change is whether the

rate of change has "discontinuity" near the critical point (or region). Catastrophe is the discontinuity of the original change, and the gradual change is the continuation of the original change. In a word, the catastrophe belongs to the category of discontinuity, and the gradual change belongs to the category of continuity.

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³¹Thom, René. *Mathematical Models of Morphogenesis*. Chichester, 1983. http://hdl.handle.net/2027/uc1.31822000475194.

The catastrophic phenomenon is fleeting and difficult to grasp. Thom has found a new way to turn a dynamic time catastrophic problem (mathematically called a 'discontinuity' problem) into a 'static' structural problem constituted by a set of catastrophes. As shown in Figure 5-2, when the cusp catastrophe model is used, it can be found on the system behavior

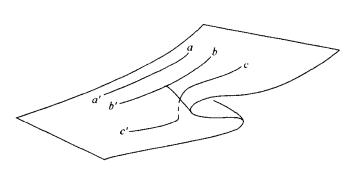


Figure 5-2 Sudden change and gradual change (Source: from Wu, 2001.)

surface of the model that there are at least three paths: a-a' is completely gradual ('completely' is used here to distinguish the latter types), and its trajectory is basically predictable. The surface of b-b' is gradual, but certain properties of the

system have undergone catastrophes, which is the type that Catastrophe Theory is most concerned. This is the kind of catastrophe that passes through a critical point, where any random stimulus at the critical point may cause large fluctuations. The results are unpredictable and fascinating. c-c' is the catastrophe in system behavior macroscopically. Its basic path can be predicted, but certain regions or structural points are unpredictable.³²

For the work-unit community, catastrophes mainly include the self-organization evolution of the community in the building space. On the one hand, it is the catastrophe in the area of the building space, such as the horizontal expansion of housing units, the vertical expansion of residential buildings, and the reduction or expansion of community's greening. On the other hand, it is the catastrophe in the nature of the functional space, such as the conversion of housing units along the street to small shops, and the functional conversion of the public service buildings in the work-unit community. These catastrophes are not only good

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³² Wu. 2001.

embodiments of the adaptability of the work-unit community system, but also indicate the possibility of equipping the system with public service facilities that meet the living needs of residents' modern life.

Gradual changes mainly refer to the self-organizing evolution of the work-unit community system on the time axis. For instance, the "comprehensive obsolescence" phenomenon presented by the residential system in the three work-unit community cases that were all built in the 1950s-1960s in this study. The second transformation behaviors of residents, such as the self-expanded courtyards on the first floor and the cantilevered clothes racks installed by residents themselves, which can be seen in all three cases. Also, there are changes in residents' living patterns, such as the pursuit of individual kitchen and bathroom and hall space, resulting in the original large bedroom-centered housing units are no longer applicable. Instead, housing units with small bedrooms and large living rooms have become more and more popular. For another example, public service buildings in the work-unit communities, such as the auditorium, dining hall and bathhouse have gradually become obsolete and useless. Residents are becoming more and more interested in various public service buildings in surrounding cities. All these gradual changes are manifestations of the continuity of the system in the long-term evolution process. And they are also traces left by various economic, cultural and other factors in the work-unit community system in the evolution of the community. From a macro perspective, these gradual changes are history and we cannot blindly choose to completely negate and renovate by completely demolishing and rebuilding them.

5.4 Hypercycle Theory

"Hypercycle theory" was put forward by the German scientist M. Eigen in the 1970s after summarizing a large number of biological experiments. It shows that during the evolution of

molecular biology, macromolecular groups can form stable structures with the help of hypercycle and can evolve and mutate. Eigen pointed out the intermediate stage of the evolution of non-life to the life stages and described the form of self-organization evolution. In his book, Wu deems that "Hypercycle Theory" is a methodology of union approach, which provides a way to effectively unfold the interactions among things and combine them into closer ones. While the dissipative structure emphasizes the system's dissipation of energy from the external environment, the hypercycle theory focuses on the non-equilibrium, nonlinear, stochastic irreversible multiple causal cyclic relationships occurring within the system, revealing the system's self-organizing evolution.³³

The basic concept of "Hypercycle Theory" is hypercycle. To better understand the concept of hypercycle, it is necessary to explain the following related concepts, including cycle, reaction cycle and catalytic cycle.

Cycle, in the daily sense, is a metaphor for the cyclical movement of things. In the physical sense, it refers to the process of a physical system starting from a certain state and returning to its initial state through a series of changes. The elements of the cycle influence each other and act as cause and effect. The balanced cycle of an isolated system cannot absorb energy form the outside world, and thus cannot achieve self-organization.

As to the reaction cycle, Eigen describes in his book, "Consider a sequence of reactions in which, at each step, the products, with or without the help of additional reactants, undergo further transformation. If, in such a sequence, any product formed is identical with a reactant of a preceding step, the system resembles a *reaction cycle* and the cycle as a whole a catalyst." For

³³ Cai. 2006.

³⁴ Eigen, Manfred. *The Hypercycle, a Principle of Natural Self-Organization*. Berlin, 1979. http://hdl.handle.net/2027/coo.31924001803539.

instance, a reaction sequence composed of A, B, C, D, ..., X, A produces B, B produces C, C produces D..., X finally produces A, thus forming a cycle.³⁵ Catalysts can be included in the reaction cycle, but they are from the outside, not produced by the reaction itself.

As Wu describes in his book, catalytic cycle is a higher level of organization form than the reaction cycle. It refers to a reaction cycle in which there is at least one intermediate that can catalyze the reaction itself. It refers to a cyclic network system composed of mutually catalyzed catalysts or reaction cycles equivalent to catalysts. Compared with the reaction cycle, the catalyst in the catalytic cycle is self-generated in the cycle.³⁶ To realize self-organization, a reaction cycle equivalent to a catalyst is required as a subsystem, so that the subsystems can be connected in a cyclic manner to form a self-replicating autocatalytic cycle. The addition of a further catalytic cycle as a subsystem can form a higher level of hypercycle. The subsystem of the hypercycle reaction can not only replicate themselves, but also catalyze its intermediate products, so that the hypercycle system is integrated and shows a bottom-up self-organization process.³⁷

Wu mentioned that the hypercycle can be simply described as a complex chemical cycle composed of multiple chemical cycles combining with each other, or it can be expanded to a cycle containing at least one *catalytic cycle*. Hypercycle is not only a formal integration of the circulatory system, but also a functional synthesis. Hypercycle means that there are nonlinear effects and that it has the functions of self-replication, self-adaptation and self-evolution.

³⁵ Wu Yanfu. *New Natural History: Self-organization Theory and the Evolution of Natural Systems (in Chinese)*. Beijing: Chemical Industry Press, 1993.

³⁶ Wu, 2001.

³⁷ Yi, 2013.

"Hypercycle organization proves to be a necessary prerequisite for maintaining the stability of information and for promoting its further evolution" 38

For the work-unit community system in this study, the hypercycle is a significant way of its evolution. From the perspective of the hierarchical structure of the community, the basic functional space, such as bedroom, kitchen and bathroom, living room, gives birth to the suite, such as two bedrooms and one living room, three bedrooms and one living room and four bedrooms and two halls. Then the suite gives birth to residential building, and finally the residential building gives birth to the entire community.

From the perspective of the relationship between the work-unit community system and residents, it belongs to an autocatalytic cycle. First of all, the community system exists based on the living needs of residents. Second, the community system will react on residents and restrict their lifestyle. Furthermore, with the development of society, as the work-unit community ages, residents would propose higher living demands, which will lead to a secondary transformation of the community system. Specifically, at the building level, internally, residents require a larger use area, relatively independent kitchen and bathroom space, living space, and work and study space. Externally, residents require the bright, comfortable and safe transportation space and entrance space, and barrier-free design that is convenient for the elderly and children to travel. At the community level, more parking space, good greening, and more public space and supporting facilities are required.³⁹

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5.5 Fractal Theory

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³⁸ Eigen, 1979.

³⁹ Yi, 2013.

"Fractal Theory" studies the complex structural processes and the evolution from simplicity to complexity in the self-organizing process and expresses the idea of how to recognize an object or thing with fractal features. Since it provides a method to analyze the spatial state and evolution process from simplicity to complexity, this theory can be called the methodology of the self-organizing fractal structure.

B. B. Mandelbrot, the Proposer of Fractal Theory, once said "Clouds are not spheres, mountains are not cones, coastlines are not circles, and bark is not smooth, nor does lighting travel in a straight line." All these natural structures have irregular shape and they are self-similar. In other words, enlarging a part of the whole can further reveal its deep structure. Different from the ideal model of Euclidean geometry, fractal geometry uses iterative language to describe the objectively existing, organic and broken geometric forms in nature.

B. B. Mandelbrot has several claims about the concept of fractal. Wu gives his own definition after synthesizing these claims. He believes that "the so-called fractal refers to some geometry or evolving form that has irregular and broken shape, and at the same time its parts are similar to the whole in certain way, and its dimension does not have to be an integer."

Fractal has two basic characteristics: self-similarity, also known as scale-free, that is, when observing things with different orders of magnitude scale, the results are same or similar structure and form. It tries to explore a new order from macro to micro between the branches of the system and the whole. The scale of the shape changes with the measurement scale; Fractal dimension, the dimensions of fractal things are generally non-integer dimensions, referred to as

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⁴⁰ Mandelbrot, Benoit B. *The Fractal Geometry of Nature*. Updated and Augmented. San Francisco: W. H. Freeman, 1983.

⁴¹ Wu. 2001.

fractal dimensions, that is, integer dimensions such as length, area, and volume cannot be used to describe the characteristics of such collective objects.⁴²

For the work-unit community, fractal means the self-similarity between different levels and scales, that is, basic functions plus dynamic boundaries. For instance, the housing units is composed of basic functional space and public transportation space (aisle) and balcony space. The residential building is composed of housing units and public transportation space (stairwell) and roof space. The community is composed of residential buildings and public transportation space (road system) and activity space. In addition, the dynamic boundaries of each level not only show self-similarities in functional properties, but more importantly, they are often the focus of contradictions at all levels of the system. These contradictions also have self-similarities. For example, all levels have similar problems such as the occupation of traffic space and the insufficient activity space.

The self-similar fractal structure of the work-unit community suggests that we can follow the bottom-up principle when retrofitting the community. That is, the retrofitting strategy can be extended from small to large, from low-level to high-level. For instance, the renovation of the aisle space at the residential building level, and then the renovation of the public space at the community level.

5.6 Chaotic Theory

"Chaotic Theory" is a methodology of the self-organizing dynamic evolving process and view, which studies the time complexity of the system moving towards self-organization. It finds out the bases and symptoms of the complexity of the system through the judgment of the

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⁴² Zhou, 2013.

⁴³ Yi, 2013.

system's sensitive dependence on the initial conditions and the non-periodic research. On ontology, chaotic theory and fractal theory constitute two aspects of one problem, that is, fractal theory studies the spatial characteristics and structures of the complexity of things while chaotic theory studies the time evolution characteristics.⁴⁴

About the definition of nonlinear dynamic chaos, E. N. Lorenz, the founder of "Chaotic Theory", says in his book: "I shall use the term *chaos* to refer collectively to processes of this sort- ones that appear to proceed according to chance even though their behavior is in fact determined by precise laws." "We may now redefine a chaotic system as one that is sensitively dependent on interior changes in initial conditions. Sensitivity to exterior changes will not by itself imply chaos."

Chaos can be divided into equilibrium chaos and nonequilibrium chaos. The equilibrium chaos means that when the system is in equilibrium, the movement of its internal subsystems is irregular and uncertain, such as thermodynamic equilibrium. Nonequilibrium chaos refers to the violent movement of a system, which is macroscopically transformed from order, such as turbulence. Its fundamental cause is the nonlinear action within the system.⁴⁶

Nonequilibrium chaos is of great significance for explaining the complexity of the selforganizing evolution of systems. There are three important viewpoints based on chaos theory. First, chaos means inherent randomness. The short-term behavior if a chaotic system can be predicted, but its long-term behavior is uncertain. In other words, complexity comes from simplicity. Simplicity is predictable in the short range, but after several iterations, it is

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⁴⁴ Wu, 2001.

⁴⁵ Lorenz, Edward N. *The Essence of Chaos*. The Jessie and John Danz Lectures. Seattle: University of Washington Press, 1993.

⁴⁶ Yi, 2013.

unpredictable in the long range. Secondly, as times goes by, initial conditions that are arbitrarily close to each other will show their own independent time evolution, that is, there is a sensitive dependence on initial conditions, such as the famous butterfly effect. Finally, chaos is neither a simple disorder or an ordered movement, but a non-periodic movement of the system. The greater the degree of symmetry breaking of this periodic movement, the higher the complexity of the system.

For work-unit communities, chaos means the inherent randomness of the residential system. For example, in the long evolution of the community, the individual additions by households continuously appeared, and there have been official extensions and new constructions led by the work-unit. In the short term, these behaviors appear to be random and disordered, but in fact, they are in line with the living needs of the residents at that time, which is understandable. Later, as time goes by, these behaviors accumulate, and quantitative changes lead to qualitative changes. In this dynamic evolution process, the work-unit community constantly form new clusters, which is in line with the bottom-up random evolution that is from simple to complex. Secondly, over time, the sensitivity of the work-unit community to initial conditions has also been reflected. For instance, the disintegration of the work-unit system, the withdrawal of the original work-unit, and the construction of surrounding urban roads and public service facilities, have all brought tremendous changes to the lives of the residents in the community and the spatial structure of the work-unit community.

5.7 Conclusions

All in all, as Wu concluded, the framework of "Self-Organizing Methodology" should include: the "Dissipative Structure Theory" created by I. Prigogine et al., which is the methodology of the self-organization with the conditions; the "Synergetic" created by H. Haken

et al., which is the dynamic methodology in the self-organization with the synergetic; the "Catastrophe Theory" created by R. Thom, which is the methodology of approach of the self-organizing evolvement; the "Hypercycle Theory" created by Eigen et al., which is the methodology of union of the self-organizing hypercycle; the "Fractal Theory" created by B. B. Mandelbrot, which is the methodology of the self-organizing fractal structure; the "Chaotic Theory" created by E. N. Lorenz et al., which is the methodology of the self-organizing dynamic evolving process and view. All these theories come down to a comprehensive and holistic self-organizing methodology.⁴⁷

Also, through the above explanations of each theory, it can be summarized the prerequisites that a system needs to meet in order to realize self-organization, its evolution process and expression form. First of all, if the system is to realize self-organization, it must have moderate openness, internal nonlinear effects and internal and external random fluctuations. Also, as a whole, it must be far from equilibrium. Secondly, according to Wu, the concept of self-organization, as a philosophical conceptual abstraction of process evolution, contains three types of evolutionary processes at the macro level: first, the evolution from non-organization to organization; second, the evolution from the low degree of organization to high degree of organization; third, the process evolves from simple to complex at the same level. From a micro point of view, the internal competition and cooperation, and the slaving principle of order parameters are all the dynamic conditions for its evolution. At the same time, the self-organizing evolution of the system will inevitably be accompanied by catastrophes and gradual changes, and self-multiplication and self-adaptation can be realized through hypercycle. Finally, the self-

⁴⁷ Wu. 2001.

⁴⁸ Wu. 2001.

organizing evolution of the system makes the system infinitely complex. Chaos indicates that the evolution is sensitive to initial conditions, and the process becomes unpredictable and uncertain, while fractal is the expression of the complex structure of the whole system.⁴⁹

For the work-unit community, whether it meets prerequisites that a system needs to meet in order to realize self-organization is the starting point for us to discuss its self-organizing evolution. The discussion of its dynamic evolution can reveal its shortcomings in the process of self-organization and help us make reasonable and practical retrofitting strategies. And chaos and fractal require us to retrofit them by following the bottom-up principle. When explaining the various theories above, simple substitute explanations for the work-unit community are included, which preliminarily proved that the work-unit community system conforms to the prerequisites, evolution process and expression methods of self-organizing evolution. Next, based on the self-organization theory, the three work-unit community cases will be analyzed in detail from the perspective of self-organization evolution, and appropriate retrofitting strategies then can be proposed based on their evolution in the past decades.

⁴⁹ Yi, 2013.

Chapter 6. The Self-Organizing Retrofitting Strategies of Work-unit Communities

There are certain reasons that many work-unit communities are still alive today after almost forty-years' abolishment of work-unit system. First, a lack of direct top-down intervention is one reason. Second, their inner vitality and subjective initiatives have also been playing a significant role. Residents have been seeking for different measures to improve their living environment, mostly minor but functional, from the room regeneration to the green space improvement in the community. In the meanwhile, the development and enrichment of surrounding urban environment have been acting as primary driving factors to merge the work-unit community into the city, such as the redevelopment of surrounding parcels, the addition or adjustment of urban road networks, subway and bus lines, and the newly constructed public facilities and open space.

Through certain kind of bottom-up self-organization process, the work-unit community has been trying to catch up with the city's development steps, and yes, they did it, many work-unit communities are still alive today. However, while recognizing the advantages of the self-organization process, it has to be admitted that the overall living environment of the work-unit community is in an inferior condition in modern era. And there seems something wrong with the self-organizing process of the work-unit community. Under the new economic and political backgrounds, most cities in P.R. China will turn to the development stage of existing stock-based development or the coexistence of incremental and existing stock-based development in the following Thirteenth Five-Year period (2016-2021). And work-unit community undoubtedly is a significant stock in Chinese cities and with a high potentiality to be retrofitted. The central government has realized the importance of the retrofitting of work-unit communities and effective policies or measures would definitely help promote the quick improvement of the living

environment in the work-unit community. Perhaps it's time to do some minor interventions by following the inner self-organizing logic of the work-unit community system.

As stated in Chapter 5, in this study, self-organization in a work-unit community mainly refers to the evolution of both the intangible social morphology and the tangible spatial morphology, which were brought by the continuous coordination and communication among the main participants in the community management, including the work-unit, residents, homeowners' committee, street office, residents' committee, Party committee, property management company and other relevant organizations. In Chapter 4, the analysis of the three work-unit communities is also carried out from the administrative and the morphological aspects. Therefore, the analysis of the self-organizing evolution and retrofitting strategies of the workunit community will also be carried out from these two aspects. Besides, as mentioned earlier, while the residential area itself exists in a physical state, human beings are the carriers of energy and information, which not only connects the interior of the residential system, but also makes the connection between the system and the outside world inevitable. The so-called economic, social, cultural and other factors that affect the residential area are realized by people. Thus, it can be said that the administrative management is the internal main cause of the morphological evolution and the latter is the external manifestation of the former.

6.1 The Self-organizing Administrative Evolution and Retrofitting of Work-unit Communities

6.1.1 The self-organizing administrative evolution of work-unit communities

Based on the analysis of the three cases in Chapter 4, it can be concluded that, for the work-unit community, during its evolution over the past few decades, main participants in its administrative evolution include the work-unit, residents, homeowners' committee, property

management company, street office, residents' committee and Party Committee. And in fact, all these participants can be deemed as internal factors within the work-unit community system or non-specific interference from the outside. Chapter 4 has briefly explained their positioning in the self-organizing system of the work-unit community. Here is a systematic summary and analysis of them.

a Work-unit

Needless to say, the work-unit is the origin of the existence of each work-unit community. Before the housing reform, even before the work-unit completely withdrew from the management of the community, the work-unit community was mainly managed by the work-unit, including the construction and maintenance of residential buildings and various public service buildings, the maintenance of the public space, cleaning and the security guard. Although there were many issues that work-unit needed to apply for approval from the higher-level government department, this was a bottom-up behavior mode, rather than the "specific interference" imposed on the work-unit or the community by the higher-level government departments. Specifically, under the premise of satisfying the national policies, the leaders of the work-unit would first decide what need to be dismantled and what need to be built according to the actual living needs of residents in the work-unit community, and then they will report the needs to higher government and only start the construction activities after getting the permission. Thus, the work-unit can be regarded as an internal force in the evolution of the work-unit community.

b. Residents and Homeowners' committee

Residents in the work-unit community, whether they are employees of the work-unit, the family committee and the informal residents' committee that they formed before the

abandonment of the work-unit system, as well as residents that have become more complicated later, are all undoubtedly internal factors of the work-unit community system. And activists among them are key participants in the management of the community. In the traditional sense, homeowners' committee is an autonomous organization composed of representatives of residents, representing the majority of residents, and speaking for the residents. The homeowners' self-governing management committee in Case 1 (XNVC) is a typical example, and the temporary property management committee of the district in Case 2 (ISSC) has the same purpose. Although the latter is not an autonomous organization formed spontaneously by residents themselves, it is an effective way to finally establish a formal homeowners' committee. All in all, both of residents and homeowners' committee belong to internal factors of the work-unit community.

c. Property management company

There is no professional property management company involved in the management of the three cases in this research, except for BZ property management company that has just settled in Case 2, which is in an experimental stage. Here there is a need to briefly explain the concept of professional property management company. In principle, it should be the homeowners' committee that sign the Property Service Contract with the company. And a professional property management company should not only responsible for the parking management of the community but also have other formal property service functions, such as the maintenance of almost all the public space, including greening, the parking management, cleaning, security and monitoring, the installation and maintenance of electric vehicle charging pile, and the maintenance of other public space.

In this study, the property management company in Case 1 and Case 3 are both only responsible for the parking management. The former signs the contract with Case 1's homeowners' self-governing management committee while the latter signs with the company retained by the original work-unit (N3503). In Case 2, there were different property management companies before and after, but in nature they were all similar to the one in Case 3, except for BZ property management company settled in August 2020. Therefore, it can be said that these non-professional property management companies are internal factors of the work-unit community since they are hired by internal factors of the work-unit community, such as residents or the work-unit, to undertake certain work in the community. They are hired to serve the residents, rather than specific interference from the outside.

d. Street office, Residents' committee, Party committee

As mentioned earlier, the concept of residents' committee in P.R. China is different from that in U. S. In P.R. China, the residents' committee is in principle an autonomous organization of residents, and the street office is the most basic level government agency. Residents' committee is set for the self-management, self-education and self-service of residents. But in fact, due to various practical factors, especially its excessive administrative power, the residents committee in the country is more like an executive agency of the street office, and many people regard it as the most basic organization of the government. Thus, this study also considers it as part of the local government as the street office. However, in reality, both of them do not exercise too much top-down executive power in the management of the work-unit community. Instead, they have always been playing roles of auxiliary. In Case 1 (XNVC), the street office mainly plays a guiding role in the work of the residents' committee and is not directly responsible for the management of the work-unit community. The residents' committee is

playing a supporting role in the work of the homeowners' self-governing management committee and residents' volunteers, and their cooperation was relatively satisfactory. As a result, Case 1 works quite well. Similar to Case 1, the street office and the residents' committee in Case 3 (#1XC) are also play supporting roles. But compared with Case 1, their work in Case 3 is not so satisfactory, and a lack of homeowners' committee composed by residents has aggravated its management defects. Case 2 (ISSC) is similar to Case 3, but there was something special about Case 2. That is, the street office was once directly involved in the management of the community from 2015 to July 2020, but its interferences were quite limited.

As for the Party committee, in P.R. China, as described in Section 4.1, there are two main lines when it comes to the management of the country: Party committees at all levels under the leadership of CPC (the Communist Party of China) Central Committee, and governments at various levels under the leadership of the State Council, and the latter is somewhat obedient to the former at the same level. Therefore, Party Committee is an indispensable existence in every work-unit community. But similar to the function of the street office and the resident' committee, it only plays a guiding role and does not directly interfere with the daily management of the work-unit community. Thus, it can be said these three factors are only nominally external forces, and their daily management of the community is not specific interferences from the outside, but more like higher-level radiation effects. And the residents' committee's management of the community is undoubtedly the most straightforward among the three.

In summary, all the main management departments or individuals in the work-unit community can be regarded as its internal factors or non-specific interferences from the outside. Thus, it can be said that in the administrative management, the work-unit community is a self-organizing system.

6.1.2 The self-organizing administrative retrofitting of work-unit communities

The current operating conditions of the case work-unit communities analyzed in Chapter 4 can be ranked by comparing them comprehensively. To specify, Case 1 (XNVC) is the best in operation, followed by Case 2 (ISSC), which is in the transitional period and its future is highly expected. Case 3 (#1XC) is the most unsatisfactory one. All of the three cases were built in the 1950s and the 1960s and have gone the same drastic changes such as the disintegration of the work-unit system, the housing reform, and the withdraw of the work-unit. But why do they present different appearances today? Next, their administrative management evolution, especially the current one, will be comparatively analyzed, aiming to propose appropriate administrative retrofitting strategies for similar work-unit communities in the country.

First, the overall administrative evolution of the three cases in the past few decades is compared and analyzed. [Figure 6-1] It can be found from the three figures that the evolution of the strength of power of the main management departments of the three cases is overall the same, which is a process is from simple to complex. The strength of power of the work-unit is gradually weakening, especially after their respective key turning points. Correspondingly, the strength of power of residents and the local government has been gradually increasing, and the property management company also begun to involve in later. However, through comparison, it can be found that the magnitude of change of the strength of power of each participant in the three cases is not exactly the same. First of all, as to the work-unit, in Case 1 and Case 2, the work-unit has basically withdrawn from the management of the community after the turning points. In Case 3, however, although the work-unit's strength of power has declined, which is similar to the previous two cases, it is still relatively strong till today. Judging from the analysis of its administrative management in Section 4.3, it is not difficult to find that this is due to the

fact that a reorganized company has been responsible for the estate of the community after the original work-unit withdrew. Second, in the three cases, the strength of power of the local government, especially the residents' committee, has gradually increased with the withdrawal of the work-unit. But it is obvious that the strength of power of the residents' committee in Case 1 is the strongest, in which the residents' committee is more responsible and has been doing a relatively good job to support the homeowners' self-governing management committee in developing and maintaining the community. Third, with the end of the national housing reform, residents' sense of autonomy and property rights has gradually increased, and the strength of power of them has also been strengthened. However, while the population composition of all the three cases has gradually become more and more complicated, residents in Case 1 are relatively cohesive and there are many activists and volunteers in the community, which is closely related to its unique homeowners' self-governing management committee and is also a result of the leading role the residents' committee. Finally, the property management company began to appear in the three cases in the later period. But as mentioned earlier, unlike the professional property management company, they basically only focus on the parking management and do not undertake other service functions.

Then current administrative organization charts of the three cases in Chapter 4 can be selected and compared, including the one in 2019 of Case 1, the one in 2015- 2020 of Case 2, and the one in 2015 of Case 3. The differences of these three administrative organization charts are exactly key internal reasons why the three work-unit community cases have gradually evolved into their different spatial forms today after the official end of the national housing reform in the late 1990s. [Figure 6-2]

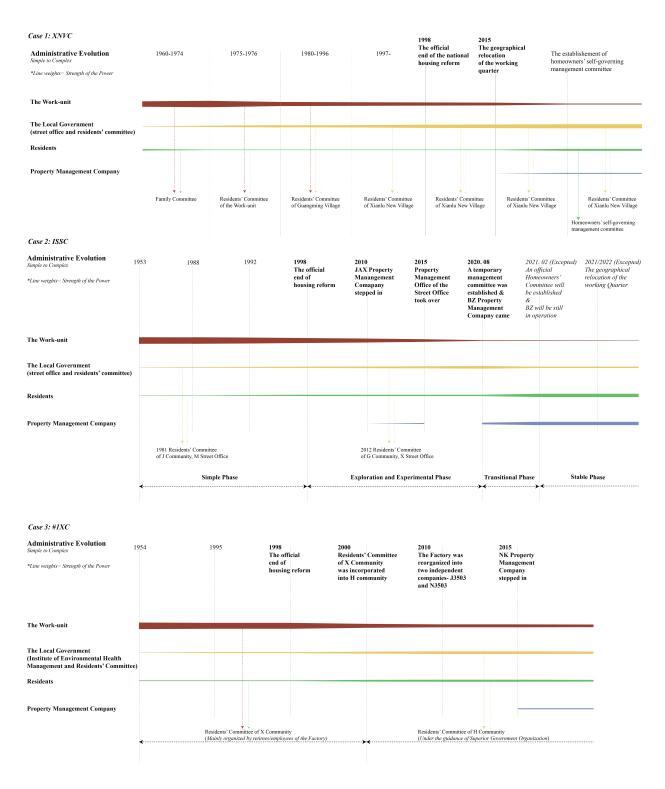
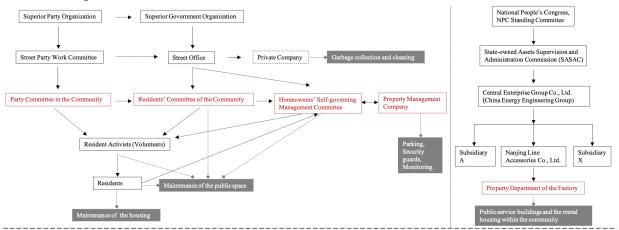


Figure 6-1 Comparison of the administrative evolution of the three cases from the 1950s to the 2010s

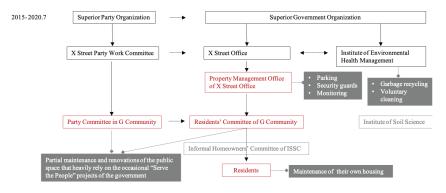
Case 1: XNVC, The administrative organization chart in 2019

Administrative Organization Chart of XNVC in 2019



- 2011 Change of the Work-unit to which NLAM Belongs (China Energy Engineering Group)
- 2014 Establishment of the Party Committee of XNVC
- 2015 Establishment of the Homeowners' Self-governing Management Committee
- · The staff are selected by residents.

Case 2: ISSC, The administrative organization chart in 2015-2020.7



Case 3: #1XC, The administrative organization chart in 2015-

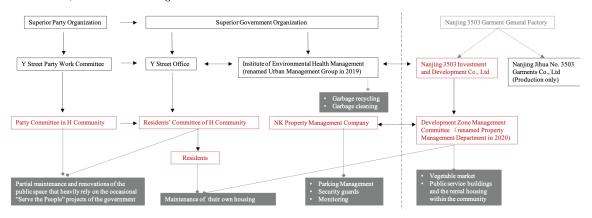


Figure 6-2 Comparison of typical administrative organization charts of the three cases

By comparing the three figures in Figure 6-2, it is not difficult to find that the most unique department in Case 1 is the homeowners' self-governing management committee, as well as the more responsible residents' committee. There is no formal homeowners' committee in Case 2. In Case 3, there is also a unique department, that is, after the original work-unit withdrew from the community, a company was reorganized to be responsible for the legacy of the work-unit, including the work-unit community. However, based on the field investigation, the company is mainly responsible for the development and management of the few retained rental housing and public service buildings. Its management of other residential buildings and public spaces is relatively weak. And its redevelopment behaviors have had huge impacts on the original work-unit community. Whether these impacts will bring new life or destruction to the community in the future remains unknown. But at present, the negative impact is greater than the positive one.

To sum up, in order to help the old work-unit community get a new life, residents' sense of autonomy is the key. The homeowners' self-governing management committee in Case 1 is a good example. For those work-unit communities that cannot establish the homeowners' committee in a short time, such as Case 2 and Case 3, the ongoing transformation route in Case 2 is worthy of reference. To specify, there are mainly three steps in the route. First, under the guidance of the residents' committee, a temporary property management committee can be formed to sign the Property Service Contract with a professional property management company. Then the handover of "One Management" can be operated as a trial operation without adding additional burden to residents. Finally, when the performance of the company can really benefit the community and residents, the collection of a higher property management fee and the establishment of a formal homeowners' committee can be considered. If this model can be

carried out smoothly, it is very likely that residents' committee can basically get out and hand over the responsibility of community management to homeowners and the property management company, thus achieve the successful handover of "One Management" mentioned in the 2016 policy. (Please refer to Section 3.2 for details)

In the meanwhile, in addition to the public participation of community residents, the role of the government, planners and designers should also be properly addressed. The government cannot take part in the management and retrofitting of the community in a "top-down" manner but should play a supporting role to serve the community residents and give them more right of speaking. Policy, technical and even financial support should be provided only when residents need it. In particular, the position and responsibility of street office and residents' committee, which are the closest to residents' daily life in the three work-unit community cases, should be clarified. The residents' committee in Case 1 has a relatively good performance, as it helps residents to manage the community and actively calls on resident activists to maintain the good development of the community. In the same way, planners and designers are no longer the implementer of government-mandated plans, but should participate in the decision-making discussion of residents, communicate with them more, provide them with relevant professional consultation, and assist in the formulation of practical and reasonable retrofitting strategies for the community.

6.2 The Self-organizing Morphological Evolution and Retrofitting of Work-unit Communities

6.2.1 The self-organizing morphological evolution of work-unit communities

After proposing retrofitting strategies for the administrative management of the work-unit community, what kind of retrofitting strategies should be taken in the morphology of the community?

In this study, the analysis of the morphological evolution of the work-unit community is carried out from two aspects: the social morphology and the spatial morphology. For the three work-unit community cases, the evolution trajectory of the population composition and property rights are basically the same. To specify, the residents were employees of the work-unit and their families only at the beginning, and the population was not gradually complicated until the housing reform in the late 1990s. And with the end of the national housing reform in the country, the property rights of the housing began to belong to individuals and the house can then be traded in the market as other commercial housing. From the perspective of self-organization theory, the complexity of the population composition is the result of the dynamic behavior of people under the premise of the moderate openness of the work-unit community system. It is also a manifestation of the gradually increasing openness of the work-unit community. The property rights change is a sudden change brought about by the national-level housing reform policy, and it is also a good embodiment of the adaptability of the work-unit community system. At last, these two kinds of social morphological evolution are origins of the competition and cooperation within the system, the slaving of the order parameters, fluctuations and other internal dynamics of the self-organizing system.

For the spatial morphological evolution of the three cases, this study is carried out from three levels: the building level, the community level and the city level. When it comes to the self-organizing retrofitting strategies of the work-unit community, the first two levels are more relevant. Through the detailed analysis of the three cases in Chapter 4, it can be found that the

spatial morphology performance of Case 1 is much better than Case 2 and Case 3, but they do share certain commonalities. First, at the building level. Although some old residential buildings have undergone some reinforcements or expansions, the interior and exterior conditions of the buildings are relatively old as a whole, with relatively small living area and poor ventilation and lighting. For instance, building No. 30 in Case 3 is literally a dangerous building. Besides, the original public service facilities in the work-unit community are facing functional replacement or demolition, and new public facilities are relatively scarce. Second, at the community level. In the past few decades, especially before the housing reform, the continuous additions and expansions of residential buildings have highly improved the building density in the community, and the layout of the community has gradually become more and more complicated. Also, these old work-unit communities provide residents with a certain greening and public space. However, residential buildings in the community are basically arranged in rows and the greening is mainly composed of strips of green space between buildings, which are separated from each other, thus there is no green network with dots, lines and planes. Moreover, pedestrians and vehicles are sharing roads, and the parking space is scarce. Also, there is a lack of public space, especially in Case 2, in which there is almost no public space for residents to meet and chat. Last but not least, it can be found that boundaries of the three work-unit community cases are all in an evolutionary trajectory of gradual opening. On the basis of retaining some previous walls or fences, the entrance of the community is in fact open to the public now.

Therefore, under the premise of excluding large-scale demolition and reconstruction or unified transformation under administrative instructions, such as the project of changing flat roofs to slope ones and natural effects, which are obviously "organized" behaviors, how to

retrofit the spatial morphology of these old work-unit communities is the next issue to be considered in this research.

When explaining various theories in Chapter 5, simple substitute explanations for the work-unit community are also included, which preliminarily proved that the work-unit community system conforms to the prerequisites, the evolution process and expression methods of self-organizing evolution. To specify, the work-unit system has moderate openness, there are various nonlinear effects inside and outside the system, the system has the state of far from equilibrium, and there have been fluctuations inside and outside the system.

As to the evolution process, first, at the macro level, the work-unit community system includes the building level and the community level, and both levels are embodiment of the transformation process of the system from non-organization to organization. At the building level, each functional space is unorganized by itself. Only when they are orderly assembled into a whole organization can it be called a housing unit. Every housing unit is combined with public spaces, such as stairs and corridors. Together they can be called a building and the same is true at the community level. Second, at the same system level, it also evolves from simple to complex. For instance, although each housing unit carries residential functions, with the change of population, building area and living habits, two-bedroom or three-bedroom housing units are more complicated than one-bedroom housing unit. Similarly, one staircase for three households or four households is more complicated than one staircase for two households. At the community level, the increase in the number of residential buildings and changes in public service buildings will also lead to a more complex work-unit community. Finally, the degree of organization evolves from low-level to high-level, and each level includes but is not limited to the functions of the next level. For instance, the housing unit bears the basic living needs of residents, the

residential building integrates them through the traffic space, and the community connects multiple residential buildings through the road network. In the meanwhile, there are also internal dynamics such as competition and cooperation, slaving principle of order parameters, and fluctuations in the self-organizing evolution of the work-unit community. Also, catastrophe and gradual changes and hypercycles can be found in the work-unit community system.

Then, the work-unit community system is self-organized, and it should be able to spontaneously develop from simple to complex, from disordered to ordered, from low-level to high-level. But as mentioned earlier, the reality is not optimistic, such as the aging of buildings, the transportation congestion, the poor living environment, and the insufficient public facilities. All in all, these are caused by too many obstacles or insufficient motivation in the self-organization process of the work-unit community. In summary, the following morphological retrofitting strategies can be drawn based on the self-organization theory.

- 6.2.2 The self-organizing morphological retrofitting of work-unit communities
- 1) To increase the degree of openness in a limited way

The openness of the self-organizing system determines its ability to accept external information and energy. While the openness of the three cases has been improved greatly in the past two decades, there are some problems with their current degree of openness. The degree of openness of the work-unit community system can be specifically explained from both internal and external aspects.

First, the degree of openness inside the work-unit community, which actually is still slightly weak for a self-organizing system. For example, with the end of the national housing reform, real estate in the community can be freely traded in the market, new populations are constantly coming in, and tenant groups begun to appear, all of which indicate that the system is

open to the outside world. But except for this, the system needs to be open to the inside. Specifically, there is a barrier between the original work-unit retired employee groups and later residents and tenants in the community. Coupled with the introverted nature of urban life, most residents are living in their own circles and refuse to communicate. This is reflected in the lack of communication space at all levels in the community. At the building level, public spaces such as staircase, walkways, and roofs in the building are illegally occupied and filled with debris. On the one hand, these behaviors pose a greater safety hazard, and on the other hand, the publicity of these space is obliterated. At the community level, while there is a number of public squares in Case 1, there is basically no public communication space in Case 2. The situation in Case 3 is a bit better than Case 2, but no better than Case 1. Public squares in Case 1 are widely used by residents of all ages and there are also several spontaneous gathering spaces in the community. There are also some gathering spaces in Case 3, but the users are basically elderly people. Also, Miao'er Mountain is an important public space in Case 3, in which there are a number of theme squares and a footpath along the mountain, but the utilization rate needs to be improved.

Therefore, it is quite necessary to appropriately improve the degree of openness of the community. At the building level, there is a need to standardize the management of public spaces in the three cases, including staircase, walkways and roof spaces, thus restoring their public attributes. In this way, the safety hazards can be eliminated and at the same time providing more public space for the communication between the original and new residents. At the community level, Case 1 can be a reference. A certain number of public spaces can be set up in the community, which are vital to the enhancement of the openness inside the community. They can increase the transmission of information between residents and make it easier for residents to learn from each other and imitate the secondary transformation behaviors of others.

Second, the degree of openness of the community to the outside world. Through the analysis of the three work-unit communities in Chapter 4, it is not difficult to find that the direct contact between the three cases and the city is quite limited physically. In Case 1, the north and east sides of the community are both built residential areas, and the west side of the community is the original working quarter, which is now a commercial housing project under construction. According to the residential culture of Chinese cities, it is unlikely that these residential areas would communicate with each other. Therefore, in Case 1, only the south side of the community has a greater possibility of openness to the outside. And the only main entrance of the community is also located on the south side. During its evolution over the past few decades, the openness of boundaries of the community has been quite limited physically too. However, with the end of the national housing reform in the late 1990s, its exchange and communication with the outside has indeed been strengthened to a certain extent. For example, the access control of its south entrance is literally open now. You can see one commercial street on the left once you entered the community. Also, in the community, various original public service buildings have undergone functional replacements, such as being used as the hotel, the industrial park and the chess room, which are all open to the outside and would attract people from the surrounding city. In addition, the lower floors of residential buildings along the southern border of the community are all street-facing commercials that are open to the city. Last but not least, the gradual complexity of residents in the community is also the key to the increasing openness of the community. All these elements are manifestations of the increasing openness of Case 1, which are also its important channels to communicate with the outside world.

Similar to Case 1, in Case 2, only its south side is adjacent to one main city road, and the lower floors of residential buildings on the south side are street-facing commercials. And after

the road expansion around 2000, the commercial street is more standardized than the one in Case 1, and the commercial types are more abundant. Also, its main entrance on the south side is also literally open and its population composition is also gradually becoming more complicated. However, there is a lack of internal attractions in Case 2. There are no small businesses that are open to the outside in Case 2, and there are no public service facilities that can attract outsiders like Case 1. The most common communication is with the working quarter on its east side, and most of them are the flow of retirees or incumbents from the work-units. Its degree of openness with the outside world is thus limited.

The situation in Case 3 is the special. It is the only one in which the original physical boundaries have been severely destroyed among the three cases. Details have been described in Section 4.3. In summary, after the impact of a series of real estate projects, its original boundaries, especially the eastern one, was eroded. Under normal circumstances, this will mean an increase in the openness of the community to the outside world. But in fact, these projects are obstacles to the communication between the community and the city. They encircle the old community and restrict it to the southwest corner. Also, they have serious effects on the original spatial structure and the introverted atmosphere of the work-unit community. The most direct connection with the outside world in Case 3 is the vegetable market on its west side, which is adjacent to a secondary urban road. There is a long distance between the main entrance on the north side and the secondary entrance on the east side to the community, despite of the fact they are all literally open to the outside now. Also, similar to Case 2, there is also a lack of commercials and public service buildings in the community that can attract external people. Of course, the unique natural resource of Case 3- Miao'er Mountain, should not be ignored.

Therefore, in summary, the openness of the three cases has been increasing in the past few decades. But through comparisons, it can be found that physically, the degree of openness of Case 1 is relatively suitable, Case 2 is slightly lower, and Case 3 is too high. In order to maintain the benign operation of the self-organizing system, a moderate degree of openness is quite necessary. Therefore, in terms of the openness to the outside world, the retrofitting of Case 2 and 3 can refer to Case 1. That is, for the old work-unit community, when its direct physical contact with the city is limited, increasing its inside attractions can be considered. For instance, public service buildings and commercials in Case 1 can attract the people from the outside, thus strengthen its communication with the city and increasing its openness in a limited way. For Case 3, on the other hand, the sense of boundary can be appropriately strengthened, such as redefining the boundary through the simple fence, so as to restore the atmosphere of the original work-unit community.

2) To improve the competition mechanism in the work-unit community

Good competition and cooperation are important driving forces for the evolution of the self-organizing system, but vicious competition will conceal the cooperation, leading to an imbalance between the two and affecting the sound development of the self-organizing system. Specific to the three work-unit community cases in this study, the imbalance between the two are mainly manifested in the competition for the public space.

At the building level, there are piles of debris in public transportation spaces, such as stairwells and aisles, which is the manifestation of a lack of coordinated management and collective maintenance and have great safety risks. At the same time, due to the old building materials, there exists mutual interferences when it comes to the sound insulation between households. Some households will also put sundries or potted plants on the anti-theft nets of the

balcony, which will affect the lives of residents living downstairs. In Case 1, for instance, due to water leakage from potted plants on the balcony of the second floor, residents living on the first floor are quite dissatisfied with residents living on the second floor. After the communication failed, residents living on the first floor locked the water meter box located in their self-added courtyard, leaving residents living on the second-floor unable access their own water meter box. Here, it is worth mentioning that residents living on the first floor are retired employees of the original work-unit, while the residents living on the second floor are young people who have recently moved to the community. The contradiction between them also proves the existence of a gap between original residents and newcomers described earlier. In addition, in the three cases, the widespread first-floor expansion that can be seen everywhere is also an encroachment on the public space, which often causes dissatisfaction among residents living upstairs. At the community level, due to the lack of parking space, the road system is mostly occupied, thus affecting the traffic. Also, the green space between residential buildings is also occupied by private constructions.

In order to avoid the excessive competition within the work-unit community, on the one hand, policy guidance and regulations of the local government are needed, and on the other hand, the autonomy of residents is quite important. In fact, there is no lack of good competitions and cooperation in the three cases. By enumerating and comparing them, the competition mechanism in other similar work-unit communities can be improved by referring to them.

In Case 1, for instance, the chaos caused by the free parking at the beginning finally was dealt with the establishment of the homeowners" self-governing management committee, who finally hired a property management company to draw parking lines and charge parking fees while offering negotiated parking principles for residents. Here, the establishment of the

committee itself is the strongest manifestation of the cooperation among residents, not to mention the negotiated parking rules among the committee, residents and the property management company. In addition, with the financial support of the local government, there are many renovated public squares in the community, in which residents can chat, rest and relax. This is a great protection for the public space in the community. Through the joint efforts of the residents' committee, the homeowner's committee and residents, the public space in the community can be saved from being privately occupied. In this way, the original public attributes of the public space can be restored, so as to provide residents with a good communication and cooperation platform and reduce the occurrence of contradictions among residents.

In Case 2, there is no homeowners' committee as in Case 1, but there is also some benign cooperation among residents. The most typical one is the ongoing elevator addition project in the community. The project actually is an autonomous and spontaneous act of residents at the initiative of the government, which is mainly implemented through the cooperation of residents and the elevator company. Only if all the homeowners living in one building agree, can the project be implemented after they sign the contract with the elevator company. As long as one household disagrees, the elevator cannot be added. Generally speaking, residents living on the first and second floors tend to oppose and those living on higher floors are more supportive. In the process of their negotiation, there may be conflicts. The residents' committee may participate in the mediation, but they do not choose either part and residents themselves are the main body.

Although the physical performance of Case 3 is relatively disappointing, there is no lack of residents' cooperation behaviors. For instance, in building No. 29, the partitions in the aisle added by residents themselves are reflections of their pursuit for security and privacy, which is also a manifestation of the cooperation between households living in the same floor. At the

community level, the scattered gathering space built by residents themselves with simple materials and the stools and chairs there are also manifestations of residents' cooperation on the use of the public space in the community.

Last but not least, it must be noted that when retrofitting the community, residents' occupation of the public space and some illegal additions should not be negated. The residents' use needs reflected behind these behaviors should be considered and optimized when retrofitting the community.

3) To focus on variable retrofitting strategies

The number of family members, personal preferences, land redevelopment, natural environment and other factors all affect the fluctuation of the work-unit community. In the face of high-speed changes in these internal and external factors, if the work-unit community system cannot make effective and timely response, these fluctuations are excessive fluctuations. For work-unit communities, fluctuations mainly include internal fluctuations and external fluctuations.

First, as mentioned in previous sections, with the end of the national housing reform, the work-unit community has attracted a large number of young migrants. Their living philosophy is different from that of the original retired workers' families in the community. And they have relatively new requirements for the layout of the housing unit, which is in contradict with the original ones of the residential building in the community, thus resulting in contradictions.

Another example of the internal fluctuation is the one caused by changes in the number of family members, which might be caused by the adulthood of children or the birth of newborns. Besides, with the advancement of science and technology and the improvement of people's requirements for the quality of life, the concept of energy saving is deeply rooted in the hearts of residents.

Thus, the requirements for heat preservation and heat insulation are much higher than before. Last but not least, with the intensification of aging in the work-unit community, the original residential buildings without accessibility design are no longer applicable. Residents are increasing calling for the installation of elevators, ramps and accessible stairs, steps and handrails in the old work-unit communities.

Second, the work-unit community also has to deal with various fluctuations from the outside. For example, in Case 1, the working quarter moved away geographically in 2015. Although the strength of power of the work-unit in the management of the community has begun to decline ever since the end of the national housing reform in the late 1990s, the relocation of the work-unit has the most significant and obvious impact on the community. And in fact, the community fell into a terrible chaos after the factory moved away in 2015. Fortunately, it finally succeeded in stabilized with the cooperation of different role players, including the street office, the residents' committee, the homeowners' self-governing management committee, the property management company, and volunteers among residents. Unlike Case 1, the working quarter of Case 2 has not been moved out yet. The surrounding development of Case 2 in the past seven decades has been relatively stable. Only its south side is close to a city road, which was expanded to its current state around 2000. In addition to the demolition of the original row of shops on the south side of the community, the most obvious impact of the road expansion on the community should be the commercialization of the three residential buildings along the street. The first floor of the three buildings began to open to the road, forming a commercial belt. According to the collected oral information, the adjacent working quarter on its east side will soon be moved away geographically within one or two years. At that time, it is worth thinking about how the community will deal with such a relatively large fluctuation. In Case 3, with the

removal of the adjacent working quarter in 2003, the following real estate development projects have had severe impacts on the original work-unit community. The original introversion of the community was instantly destroyed and could not response timely, residents thus felt lost and confused. Obviously, Case 3 lacks an effective response mechanism when faced with such large fluctuations as the surrounding real estate developments. As described in Section 5.1, when fluctuations reach the critical value of the steady state of the community, it may lead to the disintegration of the community or the formation of a new higher order in the community. If the community is unable to make timely and effective responses, these fluctuations are excessive for the community.

Therefore, when renovating the work-unit community, variable retrofitting strategies need to be considered to better cope with various fluctuations from both inside and outside the system. For example, during the renovation of housing units, variable partitions and replaceable prefabricated templates can be adopted to meet the needs of different functional spaces. The overall variable or detachable ecological design can be placed on the outer contour of the building, so as to meet the new energy-saving requirements. At the community level, variable devices can be placed in the public space to meet the needs of different behaviors and activities.¹

6.3 Conclusions

This chapter discusses the self-organizing administrative and morphological evolution of work-unit communities, and the corresponding retrofitting strategies based on the self-organization theory. In summary, administratively, residents' sense of autonomy is the key to the retrofitting of the work-unit community. Homeowners' committee established by residents are crucial to achieve the public participation of community residents. In the meanwhile, other

¹ Yi, 2013.

participants in the community management should assist residents in maintaining and retrofitting the community. To specify, the local government can offer policy, technical and financial support when residents need it. Also, the establishment of a formal homeowners' committee in the old work-unit community is inseparable from the call, publicity, education and support from the local government, especially the residents' committee. Last but not least, planners and designers should participate in the decision-making discussion of residents, communicate with them more, provide them with relevant professional consultation, and assist in the formulation of practical and reasonable retrofitting strategies for the community.

Morphologically, through the comparison and analysis of the self-organizing evolution of the three cases, based on the self-organizing logic, three main retrofitting strategies are proposed. Namely, to increase the degree of openness in a limited way, to improve the competition mechanism in the work-unit community, and to focus on variable retrofitting strategies.

Chapter 7. Conclusions and Discussions

7.1 Research Conclusions

This research starts from the conceptual analysis and clarifies the definition of the work-unit community with Chinese characteristics, which is the research object of this research. At the same time, through comparisons with similar concepts in other countries, readers can better understand China's unique work-unit community. And with the introduction of relevant research backgrounds, the necessity and urgency of the retrofitting of work-unit communities is emphasized. Also, the main methodologies adopted, especially the typo-morphology approach and the self-organization theory are interpreted in detail. Subsequently, after introducing the political background and housing-related policies at the national level, the administrative and morphological evolution of the three selected work-unit communities in the past few decades were analyzed one by one. Based on these analyses, the self-organizing evolution of case work-unit communities was analyzed and compared, and corresponding self-organizing retrofitting strategies were finally proposed. Throughout this research, the following five conclusions can be drawn:

- 1) The official end of the national housing reform in 1998 is one common key turning point for the evolution of the work-unit community in the country. After that, different work-unit communities might have different critical turning points, depending on their own handover process of the property management. The whole complicated and lengthy process starting from the end of the national housing reform can be deemed as the work-unit community's separation from the work-unit.
- 2) The overall administrative evolution of work-unit communities in the country is a process from simple to complex. That is, before the separation begun, different but specialized

departments of the work-unit that the community belonged to were main actors that were involved in the management and construction of the community. Then different role players began to involve in, including the street office, the residents' committee, residents, homeowner' committee and the property management company. And the strength of power of the work-unit in the management of the community has been becoming weaker and weaker since the separation begun. As for the morphological evolution of the work-unit community, while the social one tends to evolve from singe to complex, including the increasing complexity of the population composition and a mixture of property rights, the spatial one is generally a process from diversity to singleness, except those similar to Case 3 in this research, in which the construction of residential buildings continued even after the end of the national housing reform, and the number is quite large.

The overall evolution trajectory of the work-unit community is an "un-gating" process. There are certain common reasons for this phenomenon. First, the surrounding urban development of these old communities is becoming more and more mature, and the accompanying construction and improvement of various supporting urban facilities are attracting residents of the community to go out and merge into the city. Second, the more and more complicated population composition in the community is promoting the merge of the community into the city. Third, since the end of the 1970s, lots of original enclosure walls were torn down and residential buildings along the street in the work-unit community have been transferred to street-facing commercial buildings under the impact of the socialist market system, which have enhanced the interaction between the inside and outside of the community. Last but not least, in some work-unit communities, such as Case 1, the original public service buildings in the

community have been rented out to individuals and their functions are becoming socialized, such as being used as the hotel and offices, which will attract outsiders into the community.

4) The evolution of the work-unit community in the country conforms to the prerequisites, evolution process and expression methods of the self-organizing evolution. To specify, the work-unit system has moderate openness, there are various nonlinear effects inside and outside the system, the system has the state of far from equilibrium, and there have been fluctuations inside and outside the system. At the macro level, the work-unit community system includes the building level and the community level, and both levels are embodiment of the transformation process of the system from non-organization to organization. Also, at the same system level, it evolves from simple to complex. Finally, the degree of organization evolves from low-level to high-level, and each level includes but is not limited to the functions of the next level. In the meanwhile, there are also internal dynamics such as competition and cooperation, slaving principle of order parameters, and fluctuations in the self-organizing evolution of the work-unit community. Also, catastrophe and gradual changes and hypercycles can be found in the work-unit community system.

Thus, the work-unit community system is self-organized. In different work-unit communities, however, the power of self-organizing varies. In general, the stronger the self-organizing force, the better the development of the community. In the three work-unit community cases in this study, there is no lack of physical manifestations of the self-organizing power, but they do show the self-organizing force of different intensities. For the three work-unit community cases in this research, Case 1 demonstrates a self-organizing power that is obvious stronger than the other two cases, which is largely due to the obviously stronger residents'

autonomy in the community, specifically the existence of the homeowners' self-governing management committee.

5) While recognizing the advantages of the self-organization power, it has to be admitted that the overall living environment of the work-unit community is in an inferior condition in modern era, such as the aging of buildings, the transportation congestion, the lack of greening and pubic space, and the insufficient public facilities. As mentioned earlier, however, based on the self-organization theory, the work-unit system should be able to spontaneously develop from simple to complex, from disordered to ordered, from low-level to high-level. The reason why there are various problems in the work-unit community is because that these are too many obstacles or insufficient motivation in the self-organization process of the work-unit community. To ensure the benign operation of the self-organizing system of the work-unit community, both the administrative and morphological retrofitting strategies are proposed in this research.

Administratively, residents' sense of autonomy is the key to the retrofitting of the work-unit community. Homeowners' committee established by residents are crucial to achieve the public participation of community residents. In the meanwhile, the local government can offer policy, technical and financial support when residents need it. Also, the establishment of a formal homeowners' committee in the old work-unit community is inseparable from the call, publicity, education and support from the local government, especially the residents' committee. Last but not least, planners and designers should participate in the decision-making discussion of residents, communicate with them more, provide them with relevant professional consultation, and assist in the formulation of practical and reasonable retrofitting strategies for the community.

Morphologically, three main retrofitting strategies are proposed. First, to increase the degree of openness in a limited way. To specify, inside the community, at the building level, there is a need to standardize the management of public spaces in the three cases, including staircase, walkways and roof spaces, thus restoring their public attributes. At the community level, a certain number of public spaces can be set up in the community, which are vital to the enhancement of the openness inside the community. Also, it is quite important to maintain the moderate openness of the work-unit community to the outside world. Second, to improve the competition mechanism in the work-unit community. For work-unit communities, the focus should be on maintain the good competition for the public space in the community, both at the building level and at the community level. Third, variable retrofitting strategies need to be considered to better cope with various fluctuations from both inside and outside the work-unit community system, such as the use of variable partitions and replaceable prefabricated templates, the variable or detachable ecological design, and variable devices placed in the public space.

7.2 Excepted Contributions

1) Filling a gap in the work-unit community research

When it comes to the housing market in P.R. China, during the early times of the economic reform, while the old urban core built before 1949 has gained developer's interest because of the high land value gap due to its location, and the out-suburb too because of the possibilities to gain large parcels of land with relatively low price, the middle zone of work-unit area has been ignored. Besides, compared with the political urgency and economic operability of the transformation of the working quarter, the living quarter lacks both policy and economic support. It was deemed that the redevelopment of the work-unit community was low-profit because of the high compensations to occupiers, inferior locations compared with the old urban

core, and the deteriorated environment, which facilitated a concentric development in most Chinese cities.

Correspondingly, there is a lack of comprehensive study on the work-unit community itself in the academic field, especially in the field of urban planning and design. Most researches are still mixing working and living quarters together and the former is generally the concentration, which leaves a blank about the research on the work-unit community itself. This research, by taking the work-unit community as the main research object, would help fill the blank in the discipline.

2) Providing innovative methodologies on the work-unit community study

With the idea of "open community" as a starting point and taking the separation of the working quarter and the living quarter as important turning points, this research studies both the administrative and the morphological evolution of specific work-unit community cases in Nanjing by virtue of the typo-morphology approach and the self-organization theory, which is a relatively innovative research idea in the field. To specify, regarding the evolution of the work-unit community as a self-organizing process in hands of people living in and managing it, this study studies the work-unit community from its completion to the present through its constituent elements at different levels, with an aim to reveal the inherent law of the evolution process. At the end, both pros and cons of the self-organizing process exists in different communities are expected to be found and summarized, both for the administrative and the morphological ones. Then based on the self-organization theory, reasonable retrofitting strategies are put forward, all of which would follow the inner self-organizing logic of the work-unit community, only to promote, maintain or perfect the process with certain interventions, such as the policy, technical and financial support.

- 3) Responding to the national existing stock-based (*cunliang*) development policy

 Under the new economic and political backgrounds, most cities in P.R. China will turn to
 the development stage of the existing stock-based development or the coexistence of incremental
 and the existing stock-based development in the following Thirteenth Five-Year period (20162021). Under the guidance of such a national development strategy, the redevelopment of the
 work-unit community area is occupying a significant role because of its good location. With the
 goal of exploring practical retrofitting strategies by virtue of the self-organization theory, this
 research can offer certain strategic support for the national existing stock-based development
 policy.
- 4) Enriching the research on work-units in the second-tier cities of P.R. China

 This study is carried out by taking Nanjing as the case city. From the perspective of the
 comprehensive development of the city, Nanjing is a "normal" one, which means it is neither as
 developed as top cities, such as Beijing, Shanghai, nor as backward as the western cities, such as
 Kunming, Guiyang. While there have been lots of work-unit related researches on top Chinese
 cities, this research would enrich the work-unit study in the second-tier cities in the country as
 Nanjing.
- 5) Providing practical self-organizing retrofitting strategies for work-unit communities

 Based on the self-organization theory, this research can provide practical self-organizing
 retrofitting strategies for existing work-unit communities in P.R. China, which is actually a
 bottom-up approach. This approach can follow the inherent development logic of the work-unit
 community in the past few decades, rather than imposing large-scale top-down interferences, and
 emphasizing the spontaneous behaviors and ideas of residents. In a word, residents should be the

main body in retrofitting their own community and other participants should play supporting roles in the process.

7.3 Problems and Prospects

- 1) Due to difficulties in obtaining historical data, there are certain errors and deficiencies in the data collection process of this study, especially for the data collected through interviews. Although the author has strived to be objective and balance the remarks and opinions of different interviewees, it cannot be ruled out that some of the data might be subjective to some extent. In the future research, the data in this research can be improved and adjusted through return visits and other ways, so as to be objective and accurate as far as possible.
- Due to limited space and time, this study only selects three work-unit community cases in Nanjing as examples. On the one hand, these three cases are representative in terms of the types of the work-unit they belonged to and their geographic locations in Nanjing. And the analysis of them can help prove and explain the self-organizing evolution of the work-unit community to a large extent, and thus providing some practical self-organizing retrofitting strategies. On the other hand, however, it does not rule out the existence of other representative work-unit communities in P.R. China. Also, retrofitting strategies proposed in this research are largely based on the three work-unit community cases. Therefore, in the subsequent related studies, more typical work-unit communities can be included in the scope of the research, so as to propose more comprehensive and universal self-organizing retrofitting strategies for work-unit communities in the country.
- 3) This research advocates bottom-up self-organizing retrofitting strategies, emphasizing that residents should be the main body in the management of the work-unit community. However, according to the actual national condition in P.R. China, there is still a

long way to go to mobilize residents to be masters of their own communities. Before that, the maintenance and retrofitting of most work-unit communities still need the support of the government, such as policy, technology, and finance. But it must be ensured that these supports are based on the actual needs of residents, rather than imposed by the government on the community in a top-down manner.

4) This research is heavily based on the self-organization theory, and the research methodology has obvious sociological tendency. Therefore, retrofitting strategies proposed at the end does not specifically address some architectural transformation measures or practices. In follow-up researches, more specific and detailed retrofitting strategies can be proposed in combination with other related disciplines, such as architecture, hydropower, and structure., within the retrofitting framework proposed in this research.

Appendix - Questionnaires for Residents and Administrative staffs

Questionnaires on the Evolution and Retrofitting of Work-unit Communities Under a Self-organizing Logic: Cases in Nanjing, P.R. China

(For Residents)

Dear Sir/Madam:

I am a current doctoral student from the urban planning and design department of Harvard graduate school of design, and I actually got my Master of Architecture degree from Southeast University in this city- Nanjing. I am currently working on my doctoral research on the evolution and retrofit of work-unit communities in Nanjing, and your community is one of my study cases because of its typicality and particularity. The following questionnaires are made for my doctoral research, and it is voluntary to participate or not. If you'd like to participate, I will briefly introduce my research and the questionnaires to you.

In my research, I hope to extract certain people-oriented retrofit strategies that will follow the inner self-organizing logic of our community to improve the current living environment in it by studying its long evolution process from its appearance to present, totally almost 60 years. Thus, the majority of the questions in this questionnaire are about the physical changes that have happened in and around the community, from the housing unit, to the whole community, and to the nearby plots. The non-material administrative mode changes will also be asked. Besides, because the separation of the working quarter and the living quarter is a key turning point for this community, many questions are about those changes happened before and after the separation.

I sincerely hope to get your positive cooperation and answer the following questions according to the actual situation. Thank you so much!

FYI, all the questions are optional, and all the personal information will be kept confidential, among which the name will be coded in any publications and the contact information is only for those who agree with further contact and participations and won't be used in any publications. If you have any doubts about the questions, please do not hesitate to tell and I will be happy to explain.

- Jingping Liu

Harvard Graduate School of Design

1. Name: (Will be kept confidential and codes will be used in future publications)
2. Gender:
□ Male □ Female
3. Contact Information: (Only for those who agree with further participations, and will not be used in any publications)
4. Age:
5. Occupation:
□ Retiree of the work-unit
□ Retiree of other work-units
□ Current employee of the work-unit
□ Office worker of other work-units
□ Others
6. Do you mind telling me your family structure or How many people in your family?
7. Do you mind telling me the monthly income of your family?
8. Do you mind telling me which building are you living in?
9. Did you buy or rent your house in this community? □ Rental □ Owner

10. Since when did you start living in this work-unit community?
11. Are you the original residents in this work-unit community or the later external users: □ Original residents □ External users
12. Do you have any idea about since when has the working quarter been separated from the living quarter? and do you know what happened to the working quarter, is it moved away or shut down?
13. Do you have any idea about the changes that have happened in the original working quarter site?
14. Do you have any idea about who are responsible for the following tasks in the community, both before and after the separation of the working quarter and the living quarter?
1. Parking (both cars and non-motor vehicles)
2. Garbage collection and cleaning
3. Greening and open space (squares) maintenance
4. Security and monitoring
5. Fitness facilities
6. The collection of water power, and gas fees and the maintenance of these facilities

7. Other work about the community		
15. Do you have any ideas about any housing extensions or reinforcement that have happened in this community? Where, When, what and Who was responsible? (bott and illegal constructions included)		
16. Do you have any idea about the owners and functions of the public service the community, both before and after the separation? (The types of public ser available in different communities can be different)		
1. Auditorium		
2. Kitchen and Canteen		
3. Bathhouse		
4. Hostel		
5. Infirmary and activity room		
6. Workers' children school		
7. Kindergarten		
8. Others		

17. Do you need to get the approval from certain agencies if you want to do some renovations about your own house, such as to make interior decorations (e.g. knock of some walls), to enclose the balcony, or to install outdoor hangers, etc.? If yes, from which department?	out
18. Do you mind me visiting your house and taking some indoor pictures? If it is ok, might need to draw the plan of your house and probably need to measure the distance with the laser distance measuring instrument, which won't take too much time. That lot!	ces
19. Do you have any idea about any physical changes that have happened with the following elements within this community? If yes, when? (answers can be marked on screenshot of the map)	ı the
1. Boundaries of the community a. the enclosure form (walls, fences, non, etc.)	
b. the number and location of entrance space	
c. the street-facing building changes (whether or when was the ground floor open to the outside, and used as commercial shops)	
2. Traffic organization (or road networks)	
3. Architectural texture (or the building layout of the community)	
4. Public Space a. green space	

b. open space (squares and business streets)
5. Other physical changes
20. Do you have any idea about any changes that have happened with the following elements around this community? If yes, when? (answers can be marked on the screenshot of the map)
1. Surrounding road networks (roads, subway and bus lines)
2. Surrounding public space (commercial, medical, educational, sports and cultural facilities, parks and green space, vegetable market, and other entertainment facilities, etc.)
3. Surrounding plots functions
21. In general, are you satisfied with the current living environment in this community? From 1 to 10, how many points will you score for it?
22. What do you expect or speculate about the future of this community Will it get better and better or be torn down?

<THE END>

Questionnaires on the Evolution and Retrofitting of Work-unit Communities Under a Self-organizing Logic: Cases in Nanjing, P.R. China

(For Administrative Staffs)

Dear Sir/Madam:

I am a current doctoral student from the urban planning and design department of Harvard graduate school of design, and I actually got my Master of Architecture degree from Southeast University in this city- Nanjing. I am currently working on my doctoral research on the evolution and retrofit of work-unit communities in Nanjing, and your community is one of my study cases because of its typicality and particularity. The following questionnaires are made for my doctoral research, and it is voluntary to participate or not. If you'd like to participate, I will briefly introduce my research and the questionnaires to you.

In my research, I hope to extract certain people-oriented retrofit strategies that will follow the inner self-organizing logic of our community to improve the current living environment in it by studying its long evolution process from its appearance to present, totally almost 60 years. Thus, the majority of the questions in this questionnaire are about the physical changes that have happened in and around the community, from the housing unit, to the whole community, and to the nearby plots. The non-material administrative mode changes will be the key questions since you are more familiar with the management modes in this community. Besides, because the separation of the working quarter and the living quarter is a key watershed for this community, many questions are about those changes happened before and after the separation.

I sincerely hope to get your positive cooperation and answer the following questions according to the actual situation. Thank you so much!

FYI, all the questions are optional, and all the personal information will be kept confidential, among which the name will be coded in any publications and the contact information is only for those who agree with further contact and participations and won't be used in any publications. If you have any doubts about the questions, please do not hesitate to tell and I will be happy to explain.

- Jingping Liu

Harvard Graduate School of Design

1. Name: (Will be kept confidential and codes will be used in future publications)
2. Gender:
☐ Male ☐ Female 3. Contact Information: (Only for those who agree with further participations, and will not be used in any publications)
4. Age:
5. Which department are you working in?
□ Residents' Committee
□ Street Office
□ Owners' Self-governing Management Committee
□ Property Management Company
□ The Original Work-unit
□ Developer
□ Volunteers etc.
6. Is there Archive department for the building and community constructions? If yes, where is it and from whom should I get the permission to access the archive?
(Question 7-13 are for those administrative staffs who also live in the community, if not, jump to Question 14)
7. Do you mind telling me your family structure or How many people in your family?

8. Do you mind telling me the monthly income of your family?
9. Do you mind telling me which building are you living in?
10. Did you buy or rent your house in this community? □ Rental □ Owner
11. Since when did you start living in this work-unit community?
12. Are you the original residents in this work-unit community or the later external users? □ Original residents □ External users
13. Do you mind me visiting your house and taking some indoor pictures? If it is ok, I also might need to draw the plan of your house and probably need to measure the distances with the laser distance measuring instrument, which won't take too much time. Thanks a lot!
14. Do you have any idea about since when has the working quarter been separated from the living quarter? and do you know what happened to the working quarter, is it moved away or shut down?
15. Do you have any idea about the changes that have happened in the original working quarter site?
16. Do you have any idea about who are responsible for the following tasks in the

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community, both before and after the separation of the working quarter and the living

quarter?

1. Parking (both cars and non-motor vehicles)	
2. Garbage collection and cleaning	
3. Greening and open space (squares) maintenance	
4. Security and monitoring	
5. Fitness facilities	
6. The collection of water power, and gas fees and the maintenance of these facilities	es
7. Other work about the community	
17. Do you have any ideas about any housing extensions or reinforcement that happened in this community? Where, When, what and Who was responsible? (and illegal constructions included)	
18. Do you have any idea about the owners and functions of the public service f the community, both before and after the separation? (The types of public serv available in different communities can be different)	
1. Auditorium	
2. Kitchen and Canteen	
3. Bathhouse	

5. Infirmary and activity room	_
6. Workers' children school	_
7. Kindergarten	_
8. Others	_
19. Do the residents need to get the approval from certain agencies if they we renovations about their own house, such as to make interior decorations (e.g some walls), to enclose the balcony, or to install outdoor hangers, etc.? If yes, from which department?	
	_
20. Do you have any idea about any physical changes that have happened wi following elements within this community? If yes, when? (answers can be mascreenshot of the map)	
20. Do you have any idea about any physical changes that have happened wi following elements within this community? If yes, when? (answers can be me	
20. Do you have any idea about any physical changes that have happened wi following elements within this community? If yes, when? (answers can be mascreenshot of the map) 1. Boundaries of the community	

2. Traffic organization (or road networks)	_
3. Architectural texture (or the building layout of the community)	
4. Public Space a. green space	
b. open space (squares and business streets)	_
5. Other physical changes	_
21. Do you have any idea about any changes that have happened with the folloelements around this community? If yes, when? (answers can be marked on the of the map)	
1. Surrounding road networks (roads, subway and bus lines)	
2. Surrounding public space (commercial, medical, educational, sports and cultural parks and green space, vegetable market, and other entertainment facilities, etc.)	facilities,
3. Surrounding plots functions	

<THE END>

Bibliography

- 1. Bian, Morris L. *The Making of the State Enterprise System in Modern China: The Dynamics of Institutional Change*. Cambridge, MA: Harvard University Press, 2005.
- 2. Bray, David. Social Space and Governance in Urban China: The Danwei System from Origins to Reform. Stanford, Calif.: Stanford University Press, 2005.
- 3. Breitung, Werner. "Enclave Urbanism in China: Attitudes Towards Gated Communities in Guangzhou." *Urban Geography* 33, no. 2 (2012): 278–94.
- 4. Castex, Jean, and Panerai, Philippe. "Prospects for Typomorphology." *Lotus International*, no. 36 (1982): 94–99.
- 5. Chai, Yanwei, Chen, Lingji, and Zhang, Chun. "Transformation of Danwei System: An Angel of View on City Changes in China (in Chinese)." *World Regional Studies* 16, no. 4 (2007): 60–69.
- 6. Chai, Yanwei. "Danwei-Based Chinese Cities' Internal Life-Space Structure- A Case Study of Lanzhou City (in Chinese)." *Geographical Research* 15, no. 1 (1996): 30–38.
- 7. Chen, Fei and Gu, Kai. "Western Architectural Typology and Urban Morphology: Integration and Application (in Chinese)." *The Architect*, no. 4 (2009): 53–58.
- 8. Chen, Fei. "A New Research Framework: The Application of Urban Typomorphology in China (in Chinese)." *Architectural Journal*, no. 4 (2010): 85–90.
- 9. Chen, Zhicheng. "From 'Unit Man' to 'Social Man'- Inevitability Trend of Urban Community Development in P.R. China (in Chinese)." *Journal of Wenzhou University (Social Science Edition)* 14, no. 3 (2001): 70–74.
- 10. Conzen, M. R. G. *Alnwick, Northumberland: A Study in Town-Plan Analysis*. Publication (Institute of British Geographers); No. 27. London: George Philip, 1960.
- 11. Crawford, Margaret. Building the Workingman's Paradise: The Design of American Company Towns. Haymarket Series. New York: Verso, 1995.
- 12. Deng, Hao, Zhu, Peiyi, and Han, Dongqing. "Operative Urban History: Reading Saverio Muratori's Typomorphology Theory and Design Practices (in Chinese)." *The Architect*, no. 1 (2016): 52–61.
- 13. Fang, Rong. "Form of Streets with Public Life and Their Generative Mechanism- A Case Study of Nanjing (in Chinese)." Doctoral Dissertation, Southeast University, 2013.

- 14. Goodnough, Abby. "Disney Is Selling a Town It Built to Reflect the Past." *New York Times (1923-Current File)*. 2004.
- 15. Gu, Kai. "Urban Morphology: An Introduction and Evaluation of the Theories and the Methods (in Chinese)." *City Planning Review* 25, no. 12 (2001): 36–41.
- 16. Haken, H. *Information and Self-Organization: A Macroscopic Approach to Complex Systems*. Springer Series in Synergetics. Berlin, Heidelberg: Springer Berlin Heidelberg: Springer, 1988.
- 17. Han, Dongqing. "The Meaning of Urban Morphology in the Urban Design (in Chinese)." *The Architect*, no. 4 (2014): 35–39.
- 18. Hu, Shui. "The Transformation and Mutation of the Work Units Welfare- A Case Study on the State-Owned Enterprise in the Northeast China (in Chinese)." Doctoral Dissertation, Jilin University, 2015.
- 19. Jiang, Zhengliang. "The Pioneer of Italian Urban Morphology: Saverio Muratori (in Chinese)." *Urban Planning International* 30, no. 4 (2015): 72–78.
- 20. Kan, Har Ye, Forsyth, Ann, and Rowe, Peter G. "Redesigning China's Superblock Neighbourhoods: Policies, Opportunities and Challenges." *Journal of Urban Design* 22, no. 6 (2017): 757–77.
- 21. Krieger, Alex. *City on a Hill: Urban Idealism in America from the Puritans to the Present*. Cambridge, Massachusetts; London, England: The Belknap Press of Harvard University Press, 2019.
- 22. Li, Chen. "Relevancy Between Danwei Compound and Urban Physical Spatial Form of Nanchang, China (in Chinese)." Doctoral Dissertation, Southeast University, 2016.
- 23. Li, Shiqiao. *Understanding the Chinese City*. London: SAGE Publications Ltd, 2014.
- 24. Li, Si-Ming, Quan Hou, Susu Chen, and Chunshan Zhou. "Work, Home, and Market: The Social Transformation of Housing Space in Guangzhou, China." *Urban Geography* 31, no. 4 (May 1, 2010): 434–52.
- 25. Lin, George C. S. "China's Landed Urbanization: Neoliberalizing Politics, Land Commodification, and Municipal Finance in the Growth of Metropolises." *Environment and Planning A* 46, no. 8 (2014): 1814–35.
- 26. Liu, Kun. "The Extension of Urban Built-up Area and the Formation of Residential Space in Nanjing City's Rencent Sixty Years (in Chinese)." Master's Thesis, Southeast University, 2011.
- 27. Liu, Qinghao. "Ecological Mechanism of Urban Morphology (in Chinese)." *City Planning Review*, no. 2 (1995): 20–22.

- 28. Low, Setha, and Huang, Youqin. Is Gating Always Exclusionary? A Comparative Analysis of Gated Communities in American and Chinese Cities, 2008.
- 29. Lu, Duanfang. Remaking Chinese Urban Form: Modernity, Scarcity and Space, 1949-2005. Florence: Routledge, 2006.
- 30. Lu, Feng. "The Origin and Formation of Chinese Work-Unit System." *Chinese Sociology* 2 (1993): 91–134.
- 31. Lü, Junhua, Peter G. Rowe, and Jie Zhang. *Modern Urban Housing in China*, 1840-2000. Munich: New York: Prestel, 2001.
- 32. Lu, Tingting, Zhang, Fangzhu, and Wu, Fulong. "Place Attachment in Gated Neighbourhoods in China: Evidence from Wenzhou." *Geoforum* 92 (2018): 144–51.
- 33. Ma, Laurence J. C., and Fulong Wu. *Restructuring the Chinese City: Changing Society, Economy and Space*. London; New York: Routledge, 2005.
- 34. Mao, Zidan and Chai, Yanwei. "The Evolution and Direction of Community Governance in China's Danwei Community: A Case Study of Maofangnan Community, Beijing (in Chinese)." *Urban Studies* 20, no. 3 (2013): 17–22.
- 35. Moudon, Anne Vernez. "A Catholic Approach to Organizing What Urban Designers Should Know." *Journal of Planning Literature* 6, no. 4 (May 1, 1992): 331–49.
- 36. Moudon, Anne Vernez. "Getting to Konw the Built Landscape: Typomorphology." In *Ordering Space: Types in Architecture and Design*, Franck, K.A., Schneekloth, L.H. (Ed.). New York: Van Nostrand Reinhold, 1994.
- 37. Moudon, Anne Vernez. "Urban Morphology as an Emerging Interdisciplinary Field." *Urban Morphology*, no. 1 (1997): 3–10.
- 38. Ning, Feige. "The Organic Renewal of Country Houses Based on Typomorphology-Taking the Valley House of Xinyang, Xinxian as an Example (in Chinese)." Master's Thesis, Southeast University, 2016.
- 39. Noyes, John Humphrey. *History of American Socialisms*. New York: Dover Publications, 1966.
- 40. Owen, Robert. A New View of Society; or, Essays on the Principle of the Formation of the Human Character, and the Application of the Principle to Practice. London: Printed for Cadell and Davies, 1813.
- 41. Perry, Elizabeth J. *Shanghai on Strike: The Politics of Chinese Labor*. Stanford, Calif.: Stanford University Press, 1993.
- 42. Pollan, Michael. "Town-Building Is No Mickey Mouse Operation." *The New York Times Magazine*, 1997.

- 43. Qiao, Yongxue. "History Flux if Beijing Unit Yard and Its Effect on Beijing Urban Space (in Chinese)." *Huazhong Architecture* 22, no. 05 (2004): 91–95.
- 44. Quincy, Quatremere de. "Type." In *Oppositions Reader: Selected Readings from a Journal for Ideas and Criticism in Architecture, 1973-1984*, Hays, K.M. (Ed.). New York: Princeton Architectural Press, 1998.
- 45. Reps, John William. *The Making of Urban America: A History of City Planning in the United States*. Princeton, N.J.; Oxford: Princeton University Press, 1965.
- 46. Rowe, Peter G., Forsyth, Ann, and Kan, Har Ye. *China's Urban Communities: Concepts, Contexts, and Well-Being.* Boston: Birkhäuser, 2016.
- 47. Rymer, Russ. "Back to the Future: Disney Reinvents the Company Town. (Celebration, FL)." *Harper's Magazine* 293, no. 1757 (1996): 65.
- 48. Sellers, Charles L. "Early Mormon Community Planning." *Journal of the American Institute of Planners* 28, no. 1 (1962): 24–30.
- 49. Shaw, Victor N. *Social Control in China: A Study of Chinese Work Units*. Westport, Conn.: Praeger, 1996.
- 50. Shi, Jie, Song, Yujia, and Kong, Linglong. "From Planning Economy to Market Economy- Research on the Transformation of Nanjing Enterprise and Institution Compound During the Transition Period (in Chinese)." In *Annual National Planning Conference* 2013, 2013.
- 51. Sit, Victor. "A Window on Beijing: The Social Geography of Urban Housing in a Period of Transition, 1985-1990." *Third World Planning Review* 22, no. 3 (2000): 237–59.
- 52. Skinner, G. W., and Baker, Hugh D. R. *The City in Late Imperial China*. Stanford, Calif., 1977.
- 53. Staub, Alexandra, and Yu, Qingyang. "The 'New' Gated Housing Communities in China: Implications for Urban Identity | ARCC Conference Repository." In *ARCC Conference Repository*, 2014.
- 54. Stokols, Andrew. "Re-FORM: Accessibility and Community in China's Superblock Neighborhoods." Doctoral Dissertation, Harvard University, 2017.
- 55. Tang, Xiaolan. A Study on the Phenomenon of Urban Residential Differentiation: A Sociological Analysis of Nanjing Urban Residential Community (in Chinese). Nanjing, P.R. China: Southeast University Press, 2007.
- 56. Tönnies, Ferdinand. *Community & Society (C. P. Loomis, Ed. & Trans.)*. East Lansing, Mich.: Michigan State University Press. (Originally published 1887), 1957.

- 57. Wang, Le and Liang, Jiang. "The Analysis of the Urban Form Transformation Models of the Unit Community (in Chinese)." *Huazhong Architecture* 28, no. 7 (2010): 151–54.
- 58. Wang, Meiqin and Li, Xueying. "The Urban Housing System Reform and the Bottom of Traditional Unit Community (in Chinese)." *Shandong Social Science*, no. 4 (2011): 80–85.
- 59. Wang, Meiqin. "The Trend of Unit Community Under the Pattern of Urban Residential Space Differentiation (in Chinese)." *Journal of Suzhou University (Philosophy & Social Sciences)*, no. 6 (2010): 6–9.
- 60. Wang, Ya Ping, and Murie, Alan. "Social and Spatial Implications of Housing Reform in China." *International Journal of Urban and Regional Research* 24, no. 2 (2000): 397–417.
- 61. Wu, Fulong, and Yeh, Anthony Gar-On. "Changing Spatial Distribution and Determinants of Land Development in Chinese Cities in the Transition from a Centrally Planned Economy to a Socialist Market Economy: A Case Study of Guangzhou." *Urban Studies* 34, no. 11 (November 1, 1997): 1851–79.
- 62. Wu, Fulong. "Rediscovering the 'Gate' Under Market Transition: From Work-Unit Compounds to Commodity Housing Enclaves." *Housing Studies* 20, no. 2 (2005): 235–54.
- 63. Wu, Tong. *Research on Self-Organizing Methodology (in Chinese)*. Series of Tsinghua Science and Technology. Beijing: Tsinghua University Press, 2001.
- 64. Xiao, Zuopeng and Chai, Yanwei. "The Property Practice and Physical Space Evolution in Danwei Compound: A Case in Beijing." *Urban Development Studies* 21, no. 4 (2014): 105–12.
- 65. Xiong, Yan. "The Typological Research of Chinese Cities' Collective House (1949-2008)- Case Study on Types of Beijing Collective House (in Chinese)." Doctoral Dissertation, Huazhong University of Science and Technology, 2010.
- 66. Xu, Ying. "Narrating Gatedness in Urban China: A Comparative Study of Physical, Cognitive, and Social Forms of the Work Unit and the Commodity Gated Community." Doctoral Dissertation, University of Michigan, 2015.
- 67. Xu, Yinong. *The Chinese City in Space and Time: The Development of Urban Form in Suzhou*. Honolulu: University of Hawai'i Press, 2000.
- 68. Xue, Wenlong. "The Institutional Origins and Construction of Danwei-Community-The Case Study of Harbin in 1946s-1960s." Doctoral Dissertation, Jilin University, 2016.
- 69. Yi, Li. "The Existing City Residential Area Renovation Research Based on Self-Organization Theory (in Chinese)." Master's Thesis, Xiamen University, 2013.

- 70. Yin, Huaiting, Shen, Xiaoping, and Zhao, Zhe. "Industrial Restructuring and Urban Spatial Transformation in Xi'an." In *Restructuring the Chinese City: Changing Society, Economy and Space*, Ma, L.J.C. and Wu, F. (Ed.)., 155–74. London; New York: Routledge, 2005.
- 71. Zhang, Chun and Chai, Yanwei. "The Spatial Dynamic of Danwei Community in Transitional Urban China: Spatial Response and Land Use Renewal (in Chinese)." *Urban Planning International* 24, no. 5 (2009): 28–32.
- 72. Zhang, Chun, and Chai, Yanwei. "Un-Gated and Integrated Work Unit Communities in Post-Socialist Urban China: A Case Study from Beijing." *Habitat International* 43, no. C (2014): 79–89.
- 73. Zhang, Yan, Chai, Yanwei, and Zhou, Qianjun. "The Spatiality and Spatial Changes of Danwei Compound in Chinese Cities: Case Study of Beijing No.2 Textile Factory (in Chinese)." *Urban Planning International* 24, no. 5 (2009): 20–27.

Chapter 2

- 1. Editorial Department of "China Contemporary" Book Series. 1990. *Urban Construction in Contemporary China (in Chinese)*. 1st ed. "China Contemporary" Book Series. Beijing, P.R. China: China Social Sciences Press: Xinhua Bookstore.
- 2. Li, 2016. See Chapter 1.
- 3. Liu, 2011. See Chapter 1.
- 4. Tang, 2007. See Chapter 1.

- 1. Giroir, Guillaume. "Yosemite Villas–Mirror of Emerging Capitalism? An American-Style Gated Community in Beijing." *China Perspectives*, no. 64 (2006): 13–22.
- 2. Huang, Youqin, and Clark, William A. V. "Housing Tenure Choice in Transitional Urban China: A Multilevel Analysis." *Urban Studies* 39, no. 1 (2002): 7–32.
- 3. Huang, Youqin. "Form Work-Unit Compounds to Gated Communities: Housing Inequality and Residential Segregation in Transitional Beijing." In *Restructuring the Chinese City: Changing Society, Economy and Space*, Ma, L.J.C. and Wu, F. (Ed.)., 192–221. London; New York: Routledge, 2005.
- 4. Li, Si-Ming, and Huang, Youqin. "Urban Housing in China: Market Transition, Housing Mobility and Neighbourhood Change." *Housing Studies* 21, no. 5 (2006): 613–23.
- 5. Li, Si-Ming, and Yi, Zheng. "The Road to Homeownership Under Market Transition: Beijing, 1980-2001." *Urban Affairs Review* 42, no. 3 (2007): 342–68.

- 6. Li, Si-Ming. "Residential Mobility and Urban Change in China: What Have We Learned so Far." In *Restructuring the Chinese City: Changing Society, Economy and Space*, Ma, L.J.C. and Wu, F. (Ed.)., 175–91. London; New York: Routledge, 2005.
- 7. Li, Zhigang, and Wu, Fulong. "Socio-Spatial Differentiation and Residential Inequalities in Shanghai: A Case Study of Three Neighbourhoods." *Housing Studies* 21, no. 5 (September 1, 2006): 695–717.
- 8. Lin, 2014. See Chapter 1.
- 9. Lü, Junhua, Peter G. Rowe, and Jie Zhang. *Modern Urban Housing in China, 1840-2000*. Munich: New York: Prestel, 2001.
- 10. Plunz, Richard. *A History of Housing in New York City: Dwelling Type and Social Change in the American Metropolis*. Columbia History of Urban Life. New York: Columbia University Press, 1990.
- 11. Rowe, Peter G. Modernity and Housing. Cambridge, Mass.: MIT Press, 1993.
- 12. Stokols, 2017. See Chapter 1.
- 13. Wang and Murie, 2000. See Chapter 1.
- 14. Wang, Ya Ping. "Public Sector Housing in Urban China 1949–1988: The Case of Xian." *Housing Studies* 10, no. 1 (1995): 57–82.
- 15. Wang, Yaping, and Murie, Alan. "The Process of Commercialization of Urban Housing in China." *Urban Studies* 33, no. 6 (1996): 971–89.
- 16. Wu and Yeh, 1997. See Chapter 1.
- 17. Wu, 2005. See Chapter 1.
- 18. Wu, Fulong, and Webber, Klaire. "The Rise of 'Foreign Gated Communities' in Beijing: Between Economic Globalization and Local Institutions." *Cities* 21, no. 3 (2004): 203–13.
- 19. Wu, Fulong. "Changes in the Structure of Public Housing Provision in Urban China." *Urban Studies* 33, no. 9 (1996): 1601–27.
- 20. Wurster, Catherine Bauer. *Modern Housing*. Boston, New York: Houghton Mifflin Company, 1934.
- 21. Xiong, 2010. See Chapter 1.
- 22. Yeh, Anthony Gar-On. "Dual Land Market and Internal Spatial Structure of Chinese Cities." In *Restructuring the Chinese City: Changing Society, Economy and Space*, Ma, L.J.C. and Wu, F. (Ed.)., 59–79. London; New York: Routledge, 2005.

23. Zhang, Li. "Migrant Enclaves and Impacts of Redevelopment Policy in Chinese Cities." In *Restructuring the Chinese City: Changing Society, Economy and Space*, Ma, L.J.C. and Wu, F. (Ed.)., 243–59. London; New York: Routledge, 2005.

- 1. "A Study on the Institutional and Spatial Transition of Danwei Community in China Take Nanjing 3503 Factory Community as an Example." Accessed November 18, 2020. http://d.wanfangdata.com.cn/thesis/W2033808.
- "Compulsory Education Law of P.R. China_ The National People's Congress of P.R. China." Accessed October 11, 2020. http://www.npc.gov.cn/npc/c30834/201901/21b0be5b97e54c5088bff17903853a0d.shtml.
- 3. "Department of Basic Education of the Ministry of Education: Implementation of the Spirit of the National Conference on Basic Education_ Press Briefing_ Government Portal of the Ministry of Education of P.R. China." Accessed October 11, 2020. http://www.moe.gov.cn/jyb_xwfb/xw_fbh/moe_2606/2019/tqh20191114/sfcl/201911/t20191114 191114 408157.html.
- 4. "Introduction of Enterprise_ Nanjing Jihua No. 3503 Garments Co., Ltd." Accessed November 21, 2020. http://www.3503.com/intro/1.html.
- 5. "Introduction of No. 3503 Factory of the People's Liberation Army." *Jiangsu Statistics*, no. 12 (1997): 32.
- "Ministry of Housing and Urban-Rural Development of P.R. C Notice of Ministry of Construction, Development and Reform Commission, Ministry of Supervision, Ministry of Finance, Ministry of Land and Resources, People's Bank of China, General Administration of Taxation on Issuing the *Measures for the Administration of Affordable Housing*." Accessed November 20, 2020. http://www.mohurd.gov.cn/wjfb/200712/t20071201_157795.html.
- 7. "Nanjing Historical Buildings (Historic Lots Type) Conservation Directory (Public Consultation) _Planning Preparation in Advance_ Nanjing Planning and Natural Resources Bureau." Accessed October 11, 2020. http://ghj.nanjing.gov.cn/pqgs/ghbzpqgs/201711/t20171115_874811.html.
- 8. "Nanjing Institute of Soil Science Community _ Details of Institute of Soil Science | Second-Hand Housing | Rental Housing | Community Consultant (Nanjing Lianjia)." Accessed April 16, 2020. https://nj.lianjia.com/xiaoqu/1411000000660/.
- 9. "Nanjing Institute of Soil Science Community, 71-73 Beijing East Road_ Second-Hand Housing and Rental Housing of Nanjing Institute of Soil Science Community_ Nanjing Anjuke." Accessed October 11, 2020. https://nanjing.anjuke.com/community/view/232926.

- 10. "Nanjing No. 1, Xiaomenkou Community _ Details of No. 1 Xiaomenkou | Second-Hand Housing | Rental Housing | Community Consultant (Nanjing Lianjia)." Accessed April 24, 2020. https://nj.lianjia.com/xiaoqu/1411046917317/.
- 11. "Nanjing Xianlu New Village Community _ Details of Xinalu New Village Community | Second-Hand Housing | Rental Housing | Community Consultant (Nanjing Lianjia)." Accessed November 25, 2019. https://nj.lianjia.com/xiaoqu/2511053862135/.
- 12. "Warmly Celebrate the 50th Anniversary of Nanjing Institute of Soil Science, Chinese Academy of Sciences!" Accessed October 13, 2020. http://www.issas.cas.cn/sqzt/fzlc/1.htm.

- 1. Cai, Hua. "Research on Heilongjiang City System Evolvement and Development based on Self-Organization Theory (in Chinese)." Doctoral Dissertation, Harbin Engineering University, 2006.
- 2. Eigen, Manfred. *The Hypercycle, a Principle of Natural Self-Organization*. Berlin, 1979. http://hdl.handle.net/2027/coo.31924001803539.
- 3. Haken, 1988. See Chapter 1.
- 4. Haken, H. *Advanced Synergetics: Instability Hierarchies of Self-Organizing Systems and Devices*. Berlin, 1983. http://hdl.handle.net/2027/mdp.39015011177741.
- 5. Haken, H. *Synergetic: The Mystery of Nature (in Chinese)*. Translated by Fuhua Ling. Shanghai: Shanghai Translation Press, 2005.
- 6. Haken, H. Synergetics: An Introduction: Nonequilibrium Phase Transitions and Self-Organization in Physics, Chemistry and Biology. 3rd rev. and enl. Ed. Springer Series in Synergetics; v. 1. Berlin; New York: Springer, 1983.
- 7. Liu, Wei. "Institutional Change of Self-Organization in Residential Area Regeneration (in Chinese)." Doctoral Dissertation, Chongqing University, 2016.
- 8. Lorenz, Edward N. *The Essence of Chaos*. The Jessie and John Danz Lectures. Seattle: University of Washington Press, 1993.
- 9. Mandelbrot, Benoit B. *The Fractal Geometry of Nature*. Updated and Augmented. San Francisco: W. H. Freeman, 1983.
- 10. Nicolis, G., and Prigogine, I. *Self-Organization in Nonequilibrium Systems: From Dissipative Structures to Order through Fluctuations*. New York: Wiley, 1977.
- 11. Prigogine, I., and Stengers, Isabelle. *Order out of Chaos: Man's New Dialogue with Nature*. 1st ed. Boulder, CO: New Science Library: Distributed by Random House, 1984.

- 12. Qi, Weiqi. "A New Method: Urban Design Compatible with Self-Organization (in Chinese)." Doctoral Dissertation, Tongji University, 2006.
- 13. Shen, Xiaofeng, Wu, Tong, and Zeng, Guoping. *Self-Organizing Philosophy- A New View of Nature and Science (in Chinese)*. Series of Studies on the Frontier Issues of Contemporary Philosophy. Beijing: Central Party School Press, 1993.
- 14. Thom, René. *Mathematical Models of Morphogenesis*. Chichester, 1983. http://hdl.handle.net/2027/uc1.31822000475194.
- 15. Wu Yanfu. New Natural History: Self-organization Theory and the Evolution of Natural Systems (in Chinese). Beijing: Chemical Industry Press, 1993.
- 16. Wu, 2001. See Chapter 1.
- 17. Wu, Tong. "Outline for Self-organizing Methodology." *Journal of Systemic Dialectics*, no. 02 (2001): 4–10.
- 18. Yi, 2013. See Chapter 1.
- 19. Yuan, Xiaomeng. "Self-Organization Theories of Urban System (in Chinese)." Doctoral Dissertation, Northeast Normal University, 2006.
- 20. Zhou, Ju. "Research on Form of Community Renewal Based on Self-Organization Theory- A Case of Shenzhen Huaide Community (in Chinese)." Master's Thesis, Southwest University of Science and Technology, 2013. http://xueshu.baidu.com/usercenter/paper/show?paperid=d4172bba8a1aba507455de361e 60f11e&site=xueshu_se.

Chapter 6

1. Yi, 2013. See Chapter 1.