Research of the Spatial Model of "Small-batch quick return" Mixed Units in the Renewal of Kangle and Lujian Garment Village

A Dissertation Submitted for the Degree of Master

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ABSTRACT

China's urban development has entered a new era of urban renewal, transitioning from large-scale incremental construction to a dual focus on quality improvement of existing spaces and structural adjustment of new developments. The State Council General Office issued the Guiding Opinions on Actively and Steadily Promoting the Transformation of Urban Villages in Megacities and Super Large Cities, which emphasized the need to promote industrial transformation and upgrading in urban villages while adhering to the principle that the market should play a decisive role in resource allocation, and advancing human-centered new urbanization. Against this backdrop, Kanglu Village, a representative garment-making urban village in the Pearl River Delta's industrial urban villages, was selected as the research subject.

This paper begins with on-site field research to outline the characteristics and industrial models of garment-making urban village. It focuses on the small batch quick return garment production chain, anchoring the study in both specific garment production spaces and the larger urban fabric. The small batch quick return model in Kanglu Village is a classic example of post-Fordist production, and it reflects the future trajectory of the garment industry. This model is closely tied to the existing social organization within the village, particularly the home-place based community. However, in the current round of urban renewal, the social structure that nurtures this model is under severe threat. The current study affirms the value of preserving and enhancing the small batch quick return model and the home-place based community in situ. It also seeks to propose alternative renewal methods, different from the large-scale demolition and construction often dominated by a single stakeholder.

The theoretical research component first examines the basic characteristics and requirements of small batch quick return mixed unit through seven dimensions: scale, boundaries, open spaces, public facility locations, shop and street systems, along with the unique mixed-use modes of post-Fordist production. The design application draws on the open block theory, using the block as the fundamental design unit, and proposes new forms

for small-batch quick-return garment clusters.

The practical design component integrates the findings from the site analysis and theoretical research. Three key design strategies are proposed: (1) economic viability under mixed-use models; (2) balance between production and residential needs; and (3) compliance with regulations. In addition, two core principles are put forward in the context of the open block theory: the principle of mixed-use and the principle of openness. Based on this framework, prototype designs are developed. These start by defining the basic functional units for production and residence, and then proceed to explore preliminary combinations at both the block and building levels. The final designs are applied to the cleared plots within Kanglu Village, resulting in a comprehensive urban design.

By exploring the mechanisms, social support structures, and spatial considerations at the architectural and block levels related to the small-batch quick-return garment production model—a representative post-Fordist production method—this paper quantitatively discusses the production scale and reasonable spatial dimensions for decentralized and networked production. It ultimately proposes a more economically viable and diversified renewal model, offering important insights and references for future urban village renewal research.

Keywords: garment-making urban village ; post-fordist production ； small batch quick return ; open block theory

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Chapter 1 Introduction

1.1 Research Background and Significance

In the process of continuous urban expansion that incorporates rural land into urban areas, due to reasons such as the urban-rural dual system, these areas are unable to fully transition into urban zones and are collectively referred to as "urban villages." Due to poor collective management, urban villages face issues related to sanitation, public security, and fire safety[1]. However, their advantages, such as low rent, make them the first stop for migrant workers entering the city, addressing housing and employment issues for this population[2][3][4][5]. In some areas, local industries have grown significantly, forming a certain scale of industrial clusters[6][7].

The "Guiding Opinions on Actively and Steadily Promoting the Renovation of Urban Villages in Megacities and Super-large Cities" points out that multiple approaches should be adopted, including demolition and reconstruction, renovation and improvement, or a combination of both. These approaches correspond to areas that are suitable for demolition, unsuitable for demolition, or somewhere in between. Efforts should be made to promote industrial transformation and upgrading in urban villages, adhering to the decisive role of the market in resource allocation, and advancing people-centered new urbanization. Additionally, based on the city's industrial development plan, reasonable industrial layouts should be arranged during the renovation of urban villages, introducing high-quality industrial projects to promote industrial transformation and upgrading. Furthermore, a certain proportion of low-cost entrepreneurial space should be provided to meet the entrepreneurial needs of small and micro enterprises and individual businesses[8].

(1) Practical Significance

Conducting in-depth research on urban villages that have already developed spontaneous industrial clusters can effectively address the two extreme approaches previously used for urban village renovation: one is the passive response to complex problems, and the other is the large-scale demolition and complete redevelopment. Through research, a balanced

approach can be proposed for the future development of urban villages. This model not only addresses common issues in urban villages to a certain extent but also enables non-destructive upgrading based on the existing industrial layout and spatial structure[9].

This study focuses on two garment villages, Lujiang and Kangle (collectively referred to as Kanglu Village in later sections), located within the Zhongda Textile Circle. Thanks to its proximity to the Zhongda Cloth Market and various major garment wholesale markets, Kanglu Village rapidly developed over the past 30 to 40 years following the Reform and Opening-up policy, becoming the origin of over half of the country's mid- to low-end women's ready-to-wear garments. Therefore, it can be considered a typical garment village in the Pearl River Delta. The village features diverse production spaces, with spatial distribution and significant characteristics of the post-Fordist "small batch quick return" production model[10]. Most areas in Kanglu Village are still actively engaged in production, providing ample first-hand data for research.

However, in the new wave of urban renewal, the challenge is how to protect and enhance these naturally developed industrial structures. Guangzhou has 138 urban villages, many of which are heavily involved in commerce and trade[11]. These urban villages are often driven by specialized markets, with upstream and downstream industries forming clusters and exhibiting strong commercial attributes. Selecting Kanglu Village as a research and design subject is not only representative of commerce-oriented urban villages but also allows for a case study analysis to explore a development path that protects the original industrial advantages while achieving non-destructive upgrading. This research will provide valuable references and insights for the renovation of similar urban villages.

(2) Theoretical Significance

In the transformation of the post-Fordist production model, some scholars have discussed the corresponding urban structures and spatial characteristics. However, most of the research has focused on macro-regional scales, with less attention given to studies at the urban scale, and even less at the block or building scale[12]. The significance of this research lies in enriching the study of urban space at the block and building scale under the post-Fordist

production model, starting from specific case examples.

1.2 Literature Review

1.2.1 Urban Industrial Space under the Post-Fordist Production Model

Post-Fordist production emerged in the 1970s as a new production model that gradually replaced Fordist production, driven by changes in productive forces and production relations. Fordist production, developed from the assembly line system pioneered by Henry Ford in the early 20th century, evolved into a mature industrial production model. It centered on large-scale production and standardization, breaking down complex production processes into a series of simple, repetitive tasks on the assembly line. This significantly improved production efficiency and product consistency.

With the advent of globalization and information technology in the 1970s, post-Fordist production adopted technological innovation, networked management, and outsourcing to respond to rapidly changing market demands. Unlike the fixed production lines of the Fordist era, post-Fordist production lines became flexible, capable of swift adjustments to meet market needs. Production scales were greatly reduced, but the variety of products expanded, catering to consumers' personalized demands.

During this transition, post-Fordist production interacted with urban industrial spaces, giving rise to a production and living landscape markedly different from that of the early 20th century.

(1) How the Post-Fordist Production Model Shapes Urban Industrial Space

There is a wealth of research at the national and regional levels on how the post-Fordist production model shapes urban industrial space. Especially under the influence of industrial linkages, enterprises exhibit a significant clustering effect in market-oriented regions, which in turn drives the restructuring of urban capital, employment, and population distribution patterns, causing changes in urban spatial structure. For example, research by Sun Lei and Zhang Xiaoping found that the manufacturing center of Beijing has shifted northeast, leading to corresponding changes in employment centers, thereby expanding the city's spatial

structure[13]. Similarly, research by Lu Weiguo and Chen Wen also pointed out that manufacturing, through diffusion and re-aggregation, has driven the evolution of urban spatial structure[14]. However, there is limited research on the impact of the post-Fordist production model on urban industrial space at the city and neighborhood levels.

(2) Urban Space Supports the Post-Fordist Production Model

During the post-Fordist era, the trend of re-urbanization has become increasingly evident, indicating a reversal in trends concerning corporate location selection and population migration behavior. From these trends, it is possible to discern which types of urban spaces the post-Fordist production model favors. Re-urbanization is caused by several factors: firstly, in the context of a knowledge-based society, the previously common spatial separation between work, home, and leisure is diminishing, making mixed-use and urban environments increasingly important[15]. In the private sphere, the disintegration of household labor division means that work and home can be more easily organized within mixed-use structures, and the distance between home, workplace, childcare, and service facilities becomes shorter.

In the commercial realm, employees' preferences for urban locations also influence corporate site selection, as companies can more easily recruit skilled labor in these areas. Moreover, the post-Fordist production model's disaggregation of various production processes results in larger flows of materials and semi-finished goods, placing greater demands on urban logistics systems[16].

In addition to the factors mentioned above, the quality of the workplace is also changing in the post-Fordist era. In addition to hard location factors like land prices and transportation connectivity, soft location factors are becoming increasingly important. From the perspective of companies, attention is focused on the image of the region and the business environment, such as proximity to universities, research institutions, and higher-grade public service resources. Additionally, since highly skilled workers are highly sought after in the labor market, companies are placing greater emphasis on workplace design and the working environment for their operations, including landscape and urban quality, leisure and cultural facilities, and diverse educational and childcare resources[17].

Fig 1-1 provides a complete comparison of the characteristics of urban spatial organization and industrial area layout under Fordist and post-Fordist contexts.

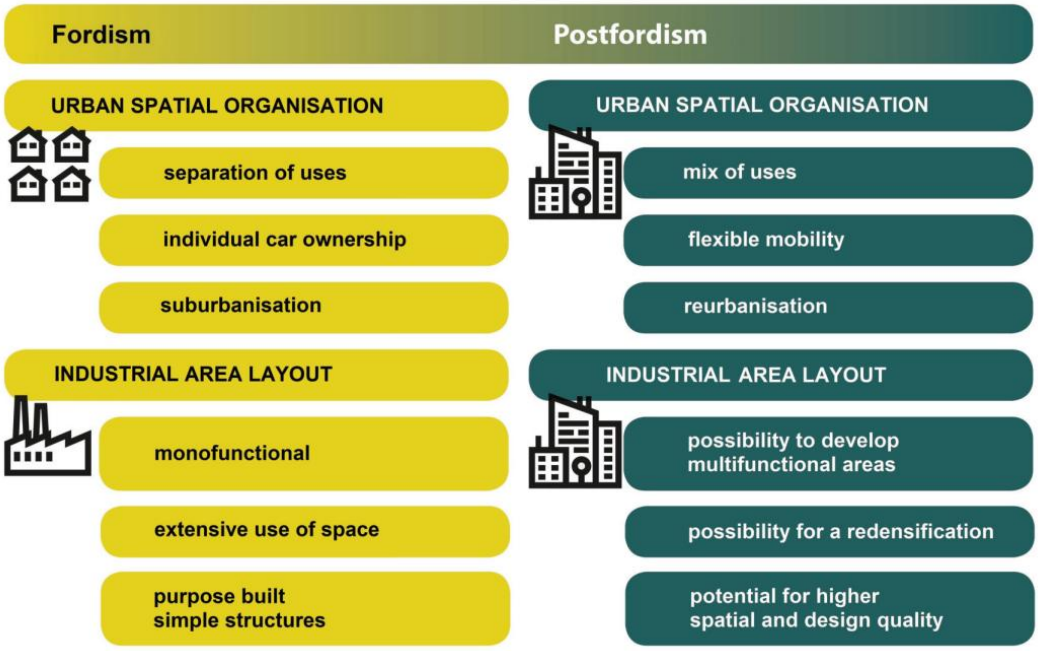


Fig 1-1 A comparative analysis of the characteristics of Fordist and Post-Fordist urban spatial organization and industrial area layout（source：Frank Roost, 2021）

1.2.2 Research on Garment Village

In recent years, several studies have focused on the origins, spatial clustering characteristics, and mechanisms of Kanglu garment villages. Garment villages emerged as part of the networked development of Guangzhou’s garment industry under the evolution of post-Fordist production, with certain areas within the village exhibiting spatial clustering. In a 2012 study on manufacturing in Kangle Village, it was found that the concentration of manufacturing enterprises in the village was a result of a cyclical causal relationship between relational proximity and geographical proximity, leading to voluntary clustering[18]. The industrial composition mainly consists of ready-to-wear garment production, with enterprises generally being small in scale and loosely connected, and the technical demands being extremely low.

In terms of spatial distribution, businesses of the same industry tend to cluster together, and industrial and residential spaces are interdependent. The vertical space is used for mixed purposes, and the distribution of enterprises is significantly influenced by the village's road

system[19][20]. These enterprises exhibit characteristics of "temporality," "endogeneity," "regional diversity," and "informality." Informal spaces can be further divided into production and business spaces, consumer service spaces, and networked spaces, which emerged in the context of the development history of the Zhongda Textile Circle. The mechanisms for the formation of informal spaces are analyzed at global, regional, and local levels, corresponding to different factors such as industrialization and the textile industry as drivers, comparative advantages between urban and rural areas, the attractiveness of urbanization, the "chain migration" of social networks, and the evolutionary replacement of new social spaces[21].

The social structure formed by the chain migration of social networks has been referred to as home-place based Community in research by Yuan Qifeng on the re-territorialization of trade-based urban villages by migrant workers[22][23]. The original village residents, who held property rights, have mostly moved out of the village, and migrant workers, as the primary users of the village, have re-territorialized the village by exerting control over the configuration of spaces and facilities, thus forming a unique area with distinct characteristics of migrant workers. On one hand, this home-place based Community provides social support for the post-Fordist small batch quick return garment production model through basic connections like kinship and familiar networks. On the other hand, it faces the danger of fragmentation under the pressures of urban renewal and the "three-old transformation" (old villages, old towns, and old factories).

Existing research has made various suggestions and recommendations for the future development of such areas, focusing on industrial development, the rational allocation of functional layouts, and promoting the urban integration of migrant workers. This includes the provision of multi-story factory buildings and low-rent housing, the encouragement of rental apartments, and promoting the equalization of public services. Moreover, attention should be paid to the human-scale aspects of spatial governance, ensuring the supply of diverse spaces and services, and maintaining fairness in urban rights and spatial justice. Additionally, community-level grassroots governance should be guided to build a multi-stakeholder model of co-governance.

1.2.3 Issues in the Research Field

The studies mentioned above provide detailed references for analyzing the site ’ s overall situation and existing problems. However, most of the existing research focuses on social dimensions and mainly offers qualitative governance solutions for social issues, while research on the post-Fordist production model and its spatial expressions and demands is relatively lacking. Moreover, there are gaps in the study of detailed spatial research at the building and street levels.

The spatial requirements of the post-Fordist production model differ significantly from those of traditional large-scale intensive production. This model requires a more flexible spatial layout, building designs better suited to small-batch, multi-variety production, and more efficient logistics and supply chain management facilities. However, current research lacks detailed discussion on how the post-Fordist production model shapes space at the block and building scales, and how these demands are reflected in specific spatial designs and planning. As a result, many urban renewal projects fail to fully meet the demands of the new production model in practice.

Additionally, during the process of urban renewal, how to preserve bottom-up growth momentum from a development and design perspective still requires in-depth exploration. In order to provide low-cost entrepreneurial spaces for migrant workers, it is necessary to consider in design and planning how to minimize the constraints of "temporality" and "informality" on development, and propose more operational and sustainable solutions.

1.3 Research Methods and Structure of the Paper

This paper progresses from analyzing the current industrial structure and spatial characteristics to applying design theories and methods, culminating in real-world site design. It begins by understanding the site ’ s general conditions, analyzing its location, social composition, and historical context. It acknowledges the significance of Kanglu Village ’ s existing small batch quick return industrial structure and the social structure of the home-place based Community. This serves as a basis to critique existing planning schemes and raise

the question: Is there a more optimal spatial arrangement for the small batch quick return industrial model?

Building upon this question, the paper conducts a qualitative thematic study of the overall garment industry. It integrates findings from field research into garment production spaces, linking each step of the garment production chain to its corresponding spatial needs. The analysis focuses on spatial requirements, the balance between production and residential areas, and these findings serve as the foundation for subsequent conservation and upgrading design proposals.

To propose new development goals and designs for the “small batch quick return” mixed-use units, two key theoretical frameworks are referenced and their application is explored locally as the project progresses. First, a future development framework is proposed with the neighborhood unit as a reference. Then, the practice of the open block method is utilized to address the creation of a three-dimensional, well-functioning urban block. Lastly, based on design goals and prototype design, a specific site is selected for practical application. The research framework is illustrated in Fig 1-2.

The specific research methods include:1.Field investigation. 2.Theoretical analysis. 3.Case studies. 4.Illustrated design.

Chapter Two, “Research of the Garment Industry Urban Village” introduces and analyzes the core issues. This chapter explores how the garment industry urban villages have grown under the post-Fordist production model, and analyzes their current state in terms of location, history, and population composition. The chapter emphasizes the integral relationship between the structure of the home-place based Community and the small batch quick return garment production process. It discusses existing planning schemes and their social impact, points out the limitations of these plans, and raises the question: Is there a better spatial form for the post-Fordist production model’s "small batch quick return" system? To answer this question, the chapter further maps the industry chain onto specific production spaces, conducting detailed research from a micro-level floor plan to a macro-level spatial distribution. Finally, it summarizes the existing problems of the garment villages and

proposes that the combination of the small batch quick return model with the home-place based Community structure presents an opportunity for the area’ s future development.

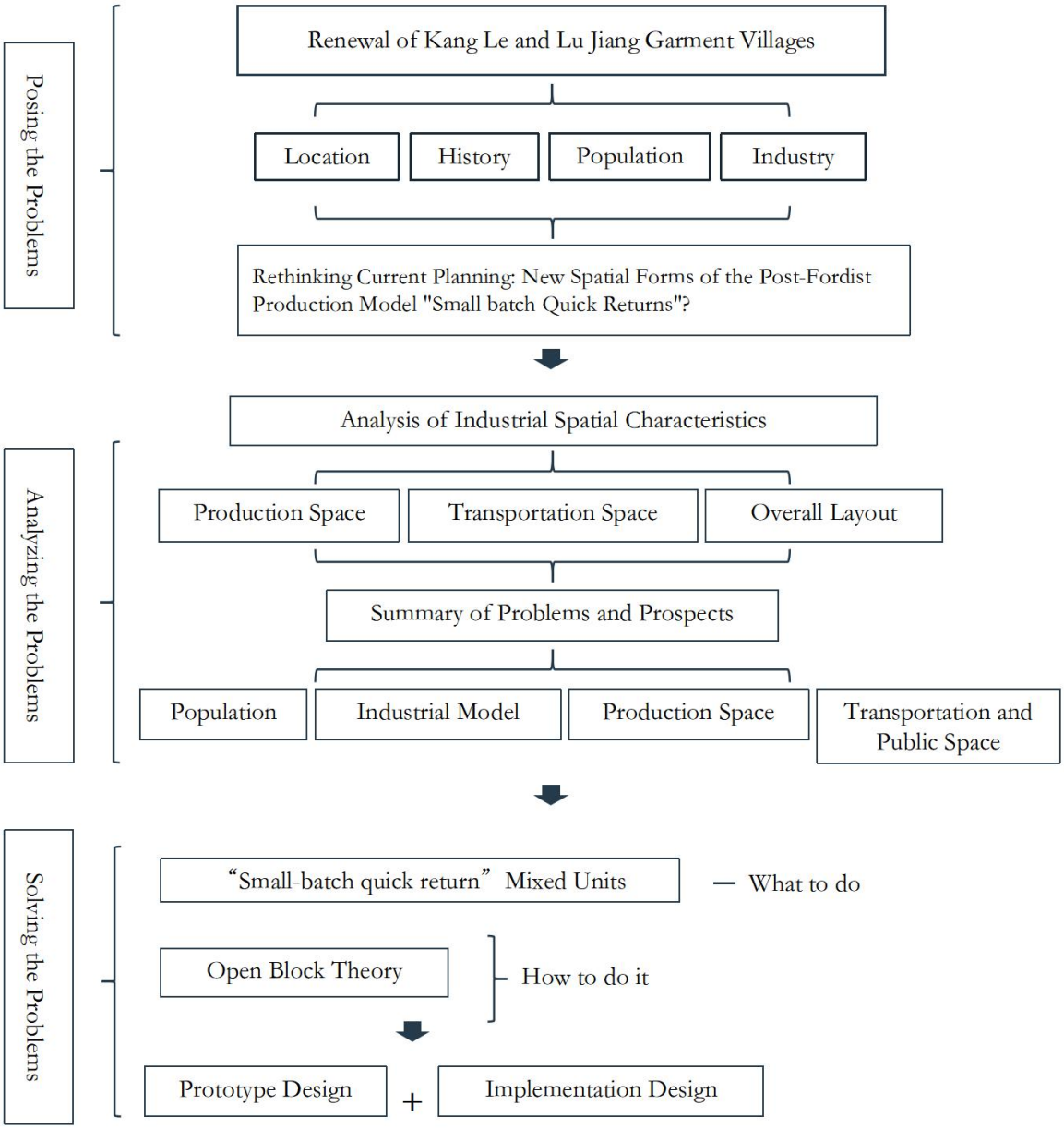


Fig 1-2 Structure of the paper (source: the author)

Chapter Three, "Theoretical Research," provides preliminary references for problem-solving. It starts from the six basic dimensions of neighborhood units and, in conjunction with the influence of post-Fordist production on urban morphological structure, proposes that the “small batch quick return” mixed-use unit should be controlled by seven basic dimensions (scale, boundaries, open spaces, location of public facilities, shop and street systems). The chapter also introduces the open block theory, outlining its origins and basic characteristics,

and extracts four basic design methods for urban block design. While affirming the practical significance of this theory for the renewal of garment villages, the chapter also points out its limitations and highlights the key points that need to be supplemented in practice.

Chapter Four, "Design Practice," proposes the final solution to the identified problems. Based on the first three chapters, three basic design objectives and strategies are put forward. This is followed by a prototype design study that explores mixed-use modes at both the block and building levels. The final prototype design is applied to a redeveloped site within the village.

Chapter 2 Overview and Study of Production Spaces in Garment Industry Urban Villages

2.1The Formation and Expansion of Garment Industry Urban Villages

The traditional textile and garment industry can be broadly divided into three parts. First, design companies develop new styles. Second, manufacturing companies handle everything from purchasing raw materials to ironing and shipping finished products. Lastly, specialized wholesale markets control the supply-demand relationship in the garment market, providing manufacturing companies with production orders or offering references to design companies based on sales trends. These three components are inseparable, interdependent, and have flourished in Guangzhou since China's reform and opening up. Fig 2-1 illustrates the changes in the spatial distribution of garment manufacturing companies in Guangzhou between 2008 and 2018, showing increased density in both the central city and surrounding key areas.

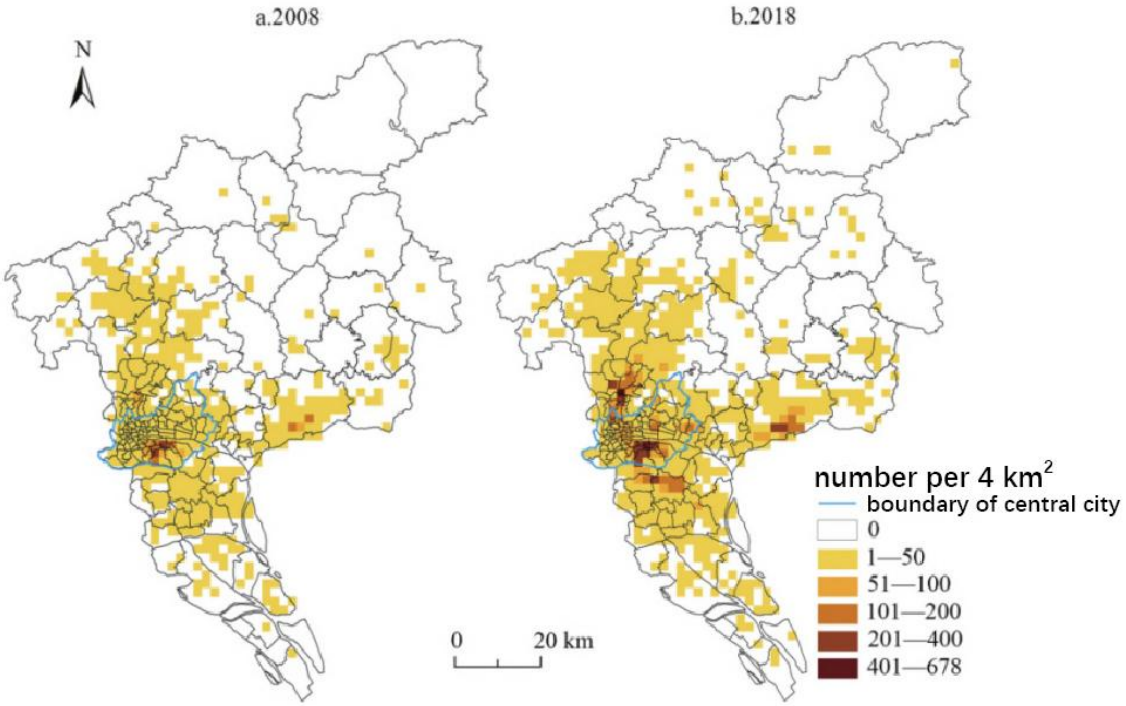


Fig 2-1 Density distribution map of Guangzhou garment factories in 2008 and 2018（source：Feng Ruzhuang, 2022）

At the beginning of the 21st century, Guangzhou’ s garment industry shifted to post-

Fordist production, with the demand side becoming increasingly important. During the Fordist era, standardized and mechanized mass production led to rapid urban expansion, with industrial production highly concentrated. Production, distribution, housing, and markets were spatially separated, creating zones with specific functions. In early models proposed by the Chicago School, such as the “concentric model”, “sector model,” and “multiple nuclei model,” industrial zones were located in large clusters around residential areas, matching Fordist production's spatial needs. Post-Fordist production, which began in the 1970s, is also known as "flexible production" or "flexible specialization." It breaks down the traditional production process into different stages and gradually replaces traditional standardized, large-scale production with more decentralized, small-batch, flexible production. Customization and variability are key characteristics of this production method.

Post-Fordist production is driven by individualized market demand, with design, marketing, and advertising adding value to the final product to meet complex market needs. Since products require rapid turnover, factories no longer need large warehouse facilities. Instead, market information and resources flow quickly back to the workshops, enabling timely decision-making and design adjustments[24]. As a result, post-Fordist production relies heavily on information and communication technologies, characterized by flexibility in both production processes and labor relations[25][26].

The garment industry has long been one of Guangzhou’s traditional strengths, playing a critical role in the city's deep involvement in globalization, with products exported to Europe, the U.S., Southeast Asia, and beyond. In recent years, to adapt to market demands, many garment companies have transitioned from the standardized, large-scale Fordist production model to the differentiated and flexible post-Fordist production method. This shift became especially pronounced after the 2008 financial crisis, when garment companies adopted more flexible production methods, placing greater emphasis on design, branding, and sales.

Under this transformation, Guangzhou's textile and garment industry landscape has undergone significant changes. Small garment enterprises have proliferated, with industry

segments evolving from centralized operations to networked structures. Manufacturing and processing companies have moved from the urban periphery to more concentrated zones within urban villages, giving rise to garment industry urban villages. These villages have thrived due to their proximity to raw material markets and well-developed transportation infrastructure. Several large garment-making villages have flourished in Guangzhou, such as Lijiang Village, Sanjiao Village, Nancun Town, and Xintang Town, known for their light textile garment villages. However, the most significant and well-known is the Kanglu garment making village in Guangzhou’s Zhongda Textile Circle. A well-known saying in the textile industry is: "For fabrics nationwide, look to Guangdong; for Guangdong fabrics, look to Zhongda." After over 40 years of development, the Zhongda Textile Circle has become the largest wholesale base for fabrics and accessories worldwide. Kanglu garment making village has grown alongside this base, and today, more than half of China’s low- to mid-end women’s ready-to-wear garments originate from the three major garment-making villages in Guangzhou's Haizhu District: Lujiang, Wufeng, and Kangle.

2.2 Textile and Garment Industry Chain

The textile and garment industry chain can be broadly divided into seven stages. First, upstream design companies handle style design and then distribute production requirements to downstream manufacturing companies. After receiving an order, the manufacturing companies visit raw material markets to select and purchase fabrics, hardware accessories, and other materials, which are then transported back to the workshop for further processing.

Fig 2-2 Complete garment manufacturing process (source: the author)

In the production workshop, the garment-making process begins with pattern making, where skilled workers create cardboard templates for each piece of fabric based on a sample garment. These templates are carefully designed to ensure precision, and once completed, they are placed on cutting tables, where the fabric is meticulously cut to match the dimensions specified by the templates. After cutting, the fabric pieces are combined with various materials, such as hardware and lace, and handed over to sewing workers. These workers play a crucial role in the transformation of the raw materials into finished

Once the sewing is complete, the garments move to the finishing area, where they undergo a series of final steps including quality inspection, ironing, and packaging. This thorough quality control ensures that only garments meeting the required standards are shipped out. Once all finishing touches are applied, the finished products are prepared for shipment to wholesale markets or directly to customers, marking the end of the production cycle.

Throughout this entire process — from fabric cutting to finishing — everything is conducted within the garment workshop, creating an efficient workflow that maximizes productivity. While some workshops may choose to outsource the pattern-making step to specialized studios, all of these activities are categorized as part of the garment production process. Additionally, the production of supplementary materials, such as dyeing and lace-making, is integral to the overall production but typically occurs separately. These

supplementary materials are often sent to the market, where factory personnel purchase them rather than being directly supplied to garment factories.

In the context of urban villages, these communities primarily focus on garment production and the production of supplementary materials within the industry chain. The garment production process can be further divided: some small family-run workshops may handle only one or two specific steps, while small and medium-sized garment factories are equipped to manage the entire production cycle, from fabric cutting to finishing. This specialization and division of labor enable urban villages to operate with remarkable flexibility and efficiency, adapting to a wide range of production demands.

Such a model has not only driven the rapid growth of the garment industry in these villages but has also solidified Kanglu Village’s vital position within the broader textile and garment industry chain. Through the flexible division of labor and collaborative efforts, urban villages are able to fully leverage their resources and spatial advantages, enhancing production efficiency and responsiveness to market changes. This collaborative framework provides robust support for the entire industry chain, positioning these villages as key players in the ever-evolving landscape of garment manufacturing.

2.3 Overview of Kanglu Garment Making Village

2.3.1 Location Analysis

The location advantage of Kanglu Garment Making Village is one of the main reasons it has grown to its current scale. The Kangle and Lujiang garment making villages are located in central Haizhu District, south of Sun Yat-sen University, and adjacent to the Zhongda Cloth Market. Being close to raw material markets and within a 30-minute to one-hour distance from several key garment wholesale markets, the village can operate on a “same-day order, same-day delivery” model. Research indicates that nearly half of the enterprises in the garment making villages chose to establish themselves in this location because of its proximity to the market, while another 30% were drawn by the concentration of related industries.

The main reasons of agglomeration	Close to market	Concentration of related industries	Lower rent	Well-informed	Policy	Infrastra cture	Strong cultural inclusiveness	Other
Total(%)	48.6	28.8	8.3	2.1	0.7	0.5	0.2	10.7

Fig 2-3 The main reasons of manufacturing enterprises agglomeration formation in Kangle village（source：Xia Lili, 2012）

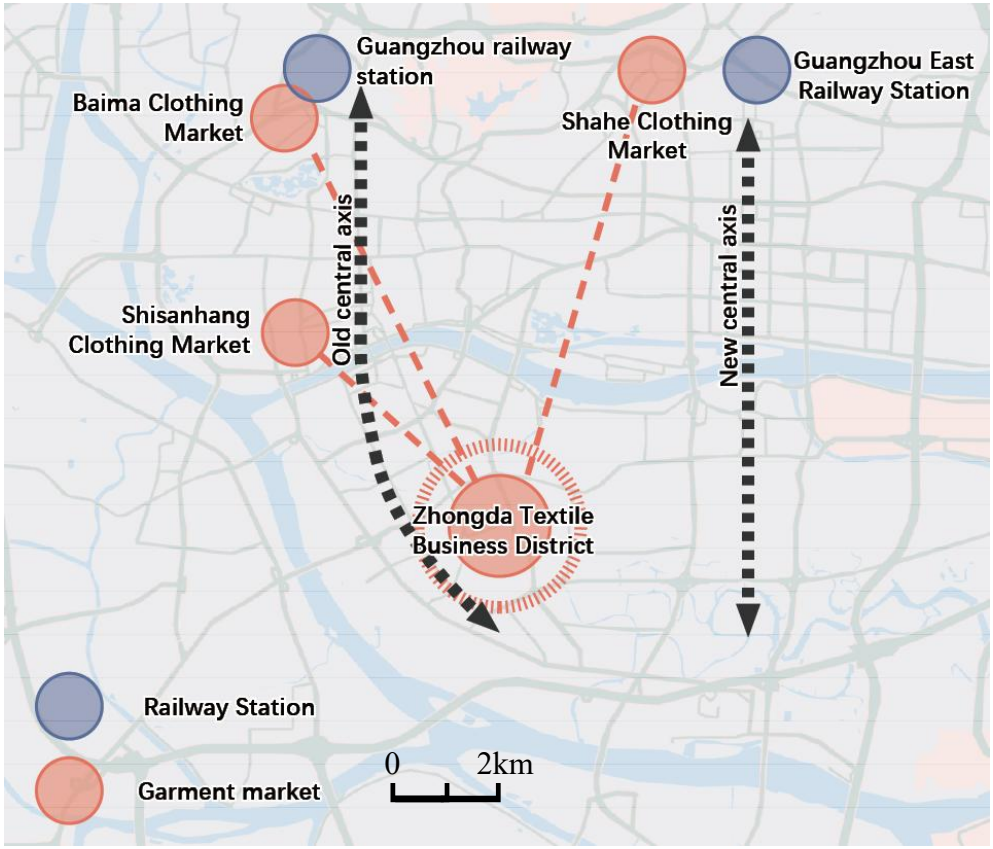


Fig 2-4 Location map of Zhongda Textile Business District (source: the author)

Fig 2-5 Overall distribution map of fabric market in Zhongda Textile Business District (source: the author)

The Zhongda Textile Circle, where Kanglu Garment Making Village is situated, has a distinct division of labor (Fig 2-5 shows the boundaries of this circle). The circle is defined by four main roads: Xingang West Road, Xinjiao West Road, Dongxiao South Road, and Guangzhou Avenue South. Kanglu Village lies in the northeastern corner, in the residential and processing zone, with the international trade core area extending north-south along Ruikang Road on its western side, and the southern part dedicated to trade, office, and design activities.

2.3.2 Historical Development

Kanglu Garment Making Village has grown in parallel with the fabric markets due to its proximity to raw material suppliers. The Zhongda Cloth Market, located to the west of Kangle and Lujiang garment making villages, runs along both sides of Ruikang Road in a north-south strip. After several rounds of professionalization and expansion, the fabric market has reached international standards. The market traces its roots back to the 1980s, when around 100 makeshift roadside stalls first appeared along Xingang West Road and Ruikang Road. These

vendors, known as illegal booth owners, had moved to this area from beneath Haizhu Bridge on Binjiang Road after Guangzhou launched a city-wide campaign to improve its urban appearance.

By 1988, these roadside stalls had evolved into small iron sheds that offered better protection from the elements. At the time, vendors had to pay a monthly stall fee of 100 yuan to the industry and commerce departments. Each iron shed could fit two small tables, with iron beds serving as shelves. Business was slow, and the market had yet to gain significant momentum. However, by 1995, Guangdong's textile industry was booming, and the Zhongda Cloth Market rapidly expanded. Several major fabric markets such as Haiyin, Xiaohong, Jiuzhou Textiles, Shunjing, and Changjiang Textile City were successfully established. Garment processing workshops, factories, and warehouses also began to develop during this period. Although the makeshift iron sheds were replaced by brick-and-mortar shops through rectification efforts, fire hazards persisted due to the densely packed nature of the market stalls.

After 2001, the Zhongda Cloth Market continued to thrive, overcoming challenges related to chaotic traffic and fire hazards, which were substantively addressed. By 2003, the market had become Guangzhou’ s leading specialized fabric wholesale market, covering more than 100,000 square meters with 17 sub-markets, employing nearly 30,000 workers. The spatial organization of the market evolved to steadily extend outward from Ruikang Road as its central axis.

Following 2005, the market experienced another significant leap with the removal of trade restrictions under the Agreement on Textiles and Clothing and the Haizhu District government's push to improve the market's planning, management, and infrastructure. These favorable domestic and international conditions allowed the Zhongda Cloth Market to gain international influence, continuing its steady growth to the present day.

During this 40-year period, the garment making villages developed rapidly in tandem with the expansion of the fabric market. In the 1980s, the original villages of Kangle and Lujiang were located to the north of what is now Kanglu Village, and two ancestral halls,

which still exist, were within this area. From 1990 to 2000, the garment factories initially began to cluster on the southern side of the original villages, as the Zhongda Cloth Market experienced explosive growth. Over the following three decades, the two villages gradually expanded southward, merging into a single urban fabric. This formed the primary street network of Kangle West Street, Kangle Zhongyue West New Street, Kanglong Street, and Lujiang South Street, which extends from west to south. The areas surrounding the main streets are primarily commercial and industrial, with building densities gradually decreasing from the center outward. This forms a transition from production spaces to living spaces, and from medium-sized production operations to small-scale family-run businesses. The left side of the main street leads directly to the Ruikang Road section of the Zhongda Cloth Market, while the right side ends at Lujiang Dongyue West Street.

In summary, the original village locations, the growth of the Zhongda Cloth Market, and the development of garment factories have collectively shaped the current urban fabric of Kanglu Village.

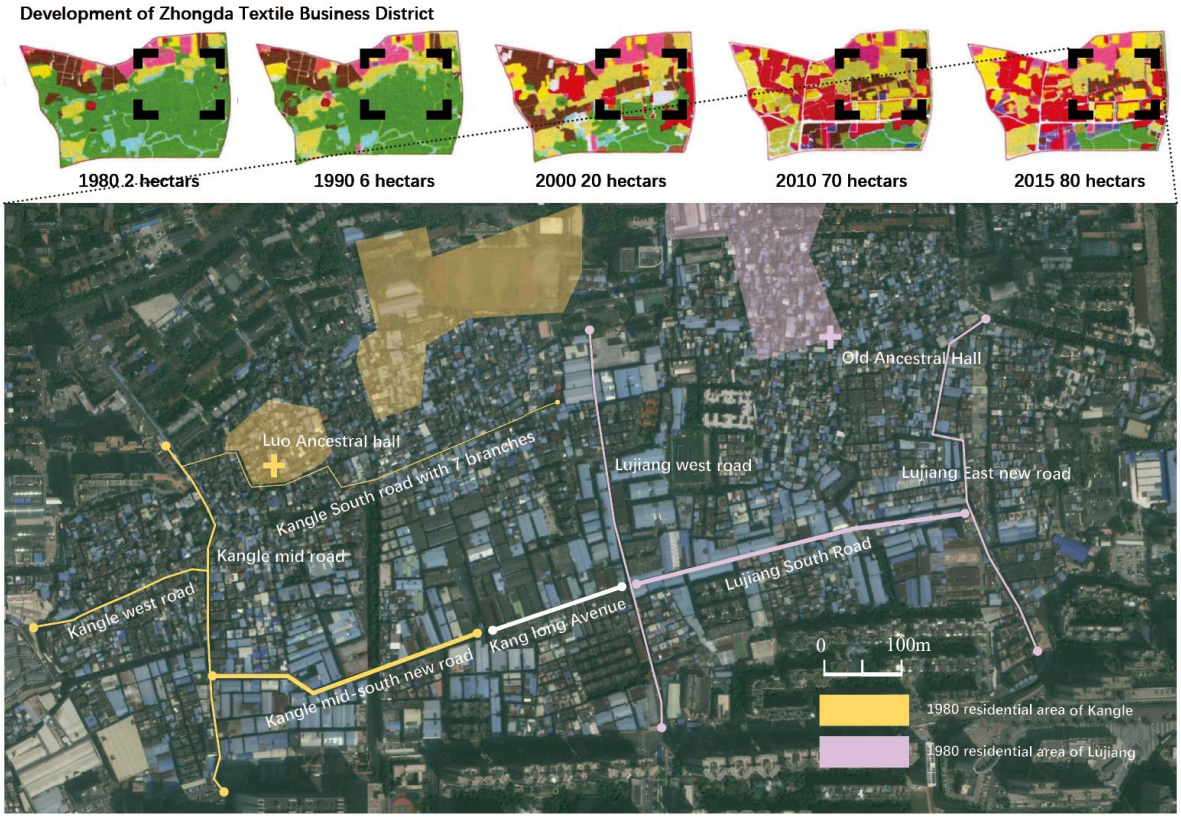


Fig 2-6 Land use changes of Zhongda Textile Business Circle and current structure of Kanglu Village (source: the author)

Today, the functional divisions between the Zhongda Cloth Market and Kanglu Garment Making Village are clearly defined. As shown in Fig 2-7, the Zhongda Cloth Market is located along Ruikang Road on the western side and continues to expand eastward, encompassing large textile trade centers such as Guangzhou International Textile City, which primarily focuses on raw material and accessory wholesale. Kanglu Garment Making Village, situated to the northeast of the cloth market, primarily engages in accessory processing and garment manufacturing.

Fig 2-7 Location Map of Major Wholesale Markets in Zhongda Textile Circle (source: the author)

2.3.3 Population Composition

Before the development of the garment industry in 1980, the two villages—Kangle and Lujiang—were natural villages that had evolved over a thousand years. Historically, Kangle Village was named after Xie Xuan, also known as Xie Lingyun , a prominent figure from the Eastern Jin Dynasty who was granted the title "Duke of Kangle", from which the village derived its name. Similarly, during the large-scale southward migration of the population in the Song Dynasty, the ancestors of Lujiang Village migrated from the Central Plains, gradually settling and developing the village.

After 1980, as the coastal economy boomed and the local garment industry developed, a group of entrepreneurs from Hubei Province gradually established the Zhongda Textile Zone from scratch. The local residents, seeking higher rental income and better living conditions, began moving out of the villages. Over time, the garment making villages took shape, evolving into what is now known as a home-place based community. Faced with an unfamiliar environment, the newcomers relied on social connections rooted in shared hometowns and kinship to buffer the anxiety and isolation caused by the alien surroundings. Over the past two decades, Kangle Village’ s garment manufacturing industry has grown rapidly, becoming an integral part of the Zhongda Cloth Market area. To accommodate industrial demand and increase rental income, many of the original villagers rented out their homes to garment and textile businesses.

According to a study conducted in 2015, only 5% of the original villagers still lived in the area, while around 22,000 migrant workers from Hubei Province had moved in, making up about 60% of the total migrant population. This number was five times that of Kangle Village’ s registered population, transforming the village into a typical home-place based community.

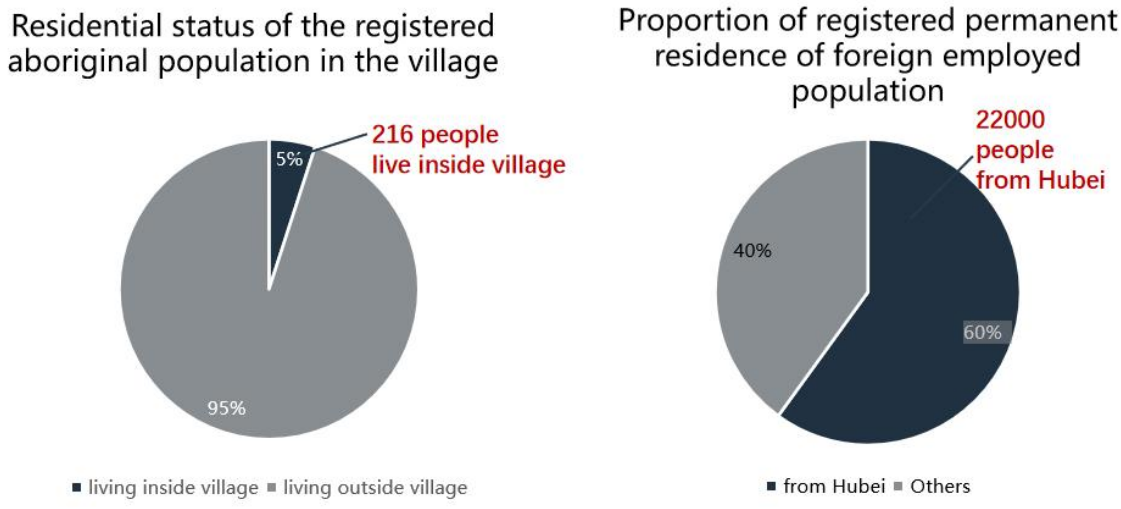


Fig 2-8 Statistics on the living conditions of indigenous people in Kangle Village and the proportion of registered residence of foreign employees（source：Yuan Qifeng, 2016）

However, while the original villagers temporarily relinquished and ceded some of their

primary rights, their status as property owners remained unchanged. Even though the village became a home-place based community, the urban village continued to operate under a relatively singular power structure. The weaker groups could only engage in production activities within specific interest frameworks. In the continuous rounds of eviction and urban renewal, these groups became the most vulnerable, subject to exploitation and marginalization.

2.3.4 Analysis of Industrial Model

(1) Introduction of the "Small Batch Quick Return" Model

The current garment industry in Kanglu Village is dominated by the "small batch quick return" production model, which differs from traditional manufacturing methods. In the traditional model, large companies typically predict trends and design garments ahead of each season, placing bulk orders with large garment factories. These factories then mass-produce the items, which are sold during the peak season. However, clothing is a typical non-standard product, with constantly shifting trends and highly varied customer preferences. Factors influencing product sales, such as fabric, style, and color preferences, are complex and hard to predict, leading to low forecast accuracy, inventory waste, and cash flow pressures for businesses. The entire process in the traditional model can take two to three months[27].

In contrast, the "small batch quick return" model significantly shortens the production cycle to 5-7 days and produces only 100-300 pieces at a time. This model begins with design but places sales before production. Items are first sold through live-streaming influencers, and based on demand, small orders are placed for manufacturing. Since these are small batches, they can be delivered quickly, reducing the risk of overproduction and excess inventory. This approach allows companies to "test" designs, and if a product is popular, it can be reordered and produced in larger quantities by bigger factories. As people increasingly value personalized products and with the rise of e-commerce, especially live-streaming sales, both brands and sellers must remain highly sensitive to market dynamics and respond quickly, making "small batch quick return" a manufacturing model that meets contemporary demands.

Fig 2-9 Comparison chart of traditional order cycle and small batch quick return order cycle (source: the author)

The "small batch quick return" model places specific demands on both the raw material supply and production processes. For raw material suppliers, this model requires stable, diverse, and convenient access to fabrics. The Zhongda Cloth Market, as an international raw material supply center, meets this need. On the production side, due to the small batch orders and extremely compressed lead times, medium and large factories are often unwilling to take on such orders. This presents opportunities for small and micro enterprises. Even small-scale factories or micro-sized family workshops can take on significant orders. Currently, many small and medium-sized enterprises are located in Kanglu Village, supporting the flexible supply chain.

(2) "Small Batch Quick Return" and Post-Fordist Production

The "small batch quick return" model can be seen as a classic example of post-Fordist production. It emerged from the pursuit of differentiated consumption, is market-oriented, relies on information and communication technologies, and emphasizes flexible, lightweight, and decentralized production—all characteristics of post-Fordist production.

(3) home-place based Community Support for the "Small Batch Quick Return" Model

In addition to its geographical advantages, Kanglu Village’ s unique home-place based community provides a strong social foundation for the "small batch quick return" model. The "quick" in "quick return" is driven by the familiarity and flexibility between participants. The operations and transactions of numerous small garment businesses are based on social relationships such as family ties, kinship, and connections with people from the same hometown, providing an important "human" support for their competitive advantage. This social support is reflected in two main aspects—transaction methods and labor practices.

Transactions primarily occur between business owners. Most garment factories are couple-run or family-operated businesses, with enterprises formed within family or kinship networks. Business dealings between companies are often based on these familiar relationships. Procurement, transportation, pattern making, and production — traditionally time-consuming processes — are greatly simplified and made more efficient due to these connections. Transactions based on personal relationships not only reduce the time and cost involved in garment production but also allow for quicker and more informal business exchanges. Business owners do not even need to meet in person; a worker, often a family member or someone from their hometown, can pick up the goods. This level of trust and understanding, developed over time, greatly reduces transaction costs.

Labor practices also reflect this familial and familiar structure. Not only are the business owners often couples, but the employees are also frequently husband-and-wife teams. Business owners prefer to hire couples, and workers are willing to work in the same factory as their spouse. In many cases, couples share a single employee number. For businesses, this arrangement improves labor efficiency, provides emotional support, and reduces worker turnover. For employees, the shared employee number often means higher income than if they worked separately. Over half of the employees in small garment factories are couples. Their close cooperation allows for greater flexibility and efficiency in overtime work, task handovers, wage negotiations, and quality control. This "family-style" employment relationship blurs the lines between employer and employee, creating a dynamic where business owners and workers often have relationships that resemble those of relatives or friends rather than a strict hierarchy[28].

In addition, many of these factories rely on temporary labor, supplemented by a small core of long-term workers. Only about half of the workforce in garment factories consists of long-term employees; the other half are temporary workers hired during peak seasons to help with urgent orders. During off-seasons, these temporary workers find employment elsewhere. This flexible labor model, built on relationships with people from the same hometown, allows businesses to save on labor costs. Workers, in turn, enjoy higher daily wages and greater

freedom. Skilled garment workers can earn between 400 and 1,000 RMB a day on a temporary basis.

The familiar relationships between business owners and workers, as well as among workers themselves, are deeply embedded in the transaction, cooperation, and employment relationships within this industry. This integration redefines the internal logic of production and trade. The combination of shared hometowns, kinship ties, and occupational specialization creates a highly competitive yet collaborative environment. This enables the garment processing industry within this cluster to reduce time and transaction costs, creating efficiency and competitive strength through familiarity and trust.

(4) Significance of the "Small Batch Quick Return" Model

Overall, considering the development trends of the garment industry and the existing conditions in Kanglu Village, the "small batch quick return" model has immense potential for localized preservation and improvement. It has already become a mainstream trend in the garment industry. According to statistics, around 70% of the garment orders received by Chinese manufacturers today are small orders, while only 30% are bulk orders for popular and basic styles. Industry experts widely believe that the fragmentation of orders will intensify, and the "small batch quick return" model will inevitably become the ultimate production mode.

The "small batch quick return" model has become the primary method for reducing order risks and maximizing profits. Kanglu Village, with its advantageous location near raw material markets and its upstream-downstream cooperative model based on home-place based community relations, combined with its existing garment manufacturing base, occupies a unique and irreplaceable niche within the "small batch quick return" ecosystem[29][30].

Thus, the question of how to preserve and enhance this model locally becomes the focus of the next discussion in this paper. Specifically, we will explore how to standardize and optimize production and transportation spaces, address the housing needs of seasonal workers, improve the quality of the community environment, strengthen cooperation, and increase cohesion. These improvements would not only consolidate Kanglu Village's unique position

in the "small batch quick return" model but also further promote the continuous development and prosperity of the regional garment industry. These measures would provide new momentum for Kanglu Village ' s growth and set a successful example for the broader industry.

2.3.5 Current Situation and Future Planning

Kanglu Village, a garment-making hub, is currently grappling with the multifaceted challenges that characterize urban villages, compounded by specific issues arising from the garment industry itself. In addition to contending with the common 15 major problems associated with urban villages — such as severe traffic congestion, fire hazards, the complexities of mixed-use residential and commercial spaces, inadequate infrastructure, rampant illegal construction, insufficient storage capacities, outdated logistics systems, intricate property rights disputes, chaotic business operations, tax evasion practices, conflicts of interest, overpopulation, security concerns, poor environmental conditions, and regulatory hurdles — Kanglu Village faces significant limitations in its spatial organization. The organically developed structures of this urban village, while historically significant, now pose obstacles to further industrial upgrades and innovations[31][32][33].

The current environment in Kanglu Village is rapidly deteriorating, exacerbated by an over-concentration of garment factories, which creates intense competition for resources and labor. Recruitment challenges are becoming increasingly pronounced, as workers seek more stable and favorable conditions elsewhere. Rising rents further strain the financial viability of businesses, while outdated business models struggle to adapt to an evolving market landscape. This combination of factors has led to a market that is nearing saturation, resulting in diminishing marginal returns for many factory owners, who find it increasingly difficult to sustain profitability in such a competitive environment.

Since January 2023, Kanglu Village has been incorporated into an urban village redevelopment plan, prompting multiple rounds of negotiations and relocations. The new planning scheme aims to relocate most production activities to a modern light industrial textile cluster in Qingyuan, which promises to offer better facilities and resources for garment

manufacturing. Concurrently, Kangle Village and Lujiang Village are being re-envisioned as integral components of the Zhongda International Innovation Valley. This initiative is designed to transform these areas into vibrant hubs for innovation, integrating technology, fashion, and cultural industries. The overarching goal is to create an international innovation hub that not only stimulates economic growth but also enhances the quality of life for residents, fostering a dynamic environment that embraces creativity and collaboration.According to the plan, only a small portion of Fenghe Village will retain key production processes, such as design, pattern making, and the core "small batch quick return" production model. This will be achieved through a spatial layout that maximizes vertical space, with production facilities located in podium structures and office spaces in tower buildings[34].

However, the well-established industrial ecosystem, which has developed naturally over the past three decades, cannot be entirely relocated from this area in a short period. The "small batch quick return" garment-making model heavily depends on this mature industrial ecosystem. The region boasts the fastest global response time for orders, a speed that is unmatched elsewhere. In Kanglu Village, garment factories operate 24/7. Being close to the Zhongda Cloth Market, individuals can purchase fabrics and materials during the day and bring them directly back to the village for cutting the same evening. The following morning, garment workers can begin stitching the cut fabric to produce finished garments, which are then immediately delivered to customers at nearby distribution hubs like Shahe. As a result, most factory owners are reluctant to relocate to Qingyuan, where the industrial ecosystem is less mature, fearing they would lose their current speed advantage[35].

Despite facing the pressure of redevelopment, the demand for labor and production in Kanglu Village remains high. During the spring 2024 recruitment season, garment factory owners formed lines to hire workers, offering day wages as high as 700 RMB. Furthermore, the proposed new urban layout does not fully consider the preservation of the key social structure that underpins the existing industrial model—the home-place based community[36].

This paper raises concerns about the current redevelopment plan, suggesting that in-

depth research into the existing industrial space and supply chain is necessary. By integrating relevant theories, this research aims to explore new spatial forms for the "small batch quick return" garment-making village within the framework of post-Fordist production models.

2.4 Kanglu Garment Making Village: Industrial Space and Characteristics

To study the production space units and their organizational characteristics under the post-Fordist networked production model, this paper will start with an analysis of the smallest garment-making units within the site, gradually expanding the scale and scope of analysis. It will examine how these garment-making units are organized within single buildings and urban spaces.

2.4.1 Production Chain and Garment Making Space

A complete garment production chain involves five main steps: pattern making, cutting, sewing, finishing, and shipping. However, due to market demands for smaller order sizes and tight deadlines, many small family workshops only handle 1 to 3 of these steps. The scale of these spaces can be categorized into the following types, from smallest to largest:

Smallest Garment Unit Type: As shown in Fig 2-10, these units have overall depths and widths not exceeding 10 meters. They are often the result of unauthorized modifications, such as converting a ground-floor living room into a workshop or illegally constructing iron sheds on upper floors for production. Due to their limited size, these units can accommodate only 1 to 2 garment-making processes. They are primarily located in dense residential areas away from main roads, making regulation challenging. Workers are typically migrant laborers who rent these spaces. During off-peak seasons, production is handled entirely by family members; in peak seasons, additional workers are recruited to increase output. Besides serving as sewing workshops, this type of space can also be used for pattern making.

Medium Size Garment Unit Type: As depicted in the Fig 2-11, this type includes functions for live streaming e-commerce, residential use, and storage, with overall depths and widths of approximately 10 meters. These units are typically converted from multi-story

residential buildings and may have fire safety issues in storage areas. They are still found in dense residential zones away from main roads and can handle more production processes.

Minimum Space Type for All Production Steps: Shown in the Fig 2-12, these units measure about 20 meters by 10 meters. The key difference here is that they have enough space for cutting tables and include a dedicated finishing area (for packing and ironing). These units were designed from the outset for production and do not include residential areas, leading to a higher turnover of workers.

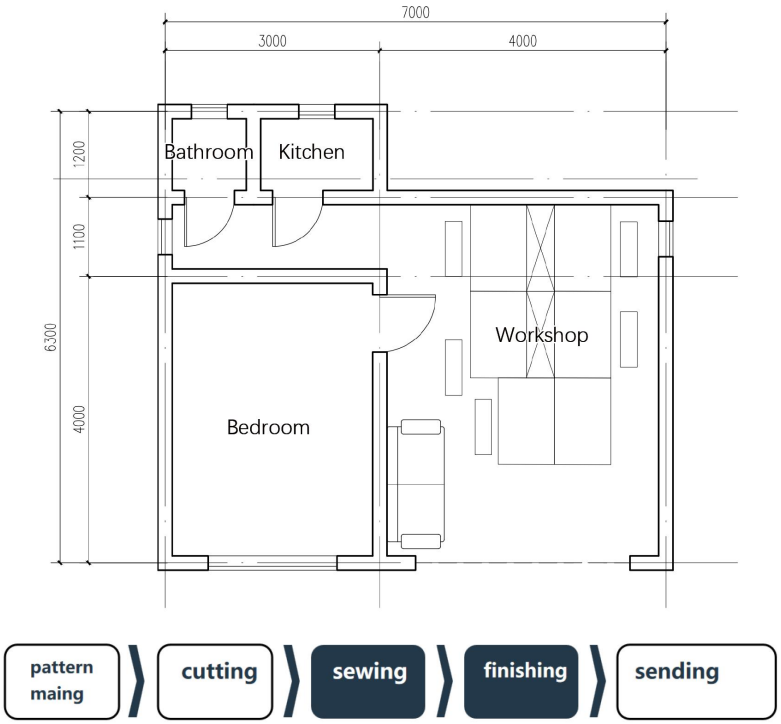


Fig 2-10 Layout of smallest garment production unit type and the garment making processes it contains. (source: the author)

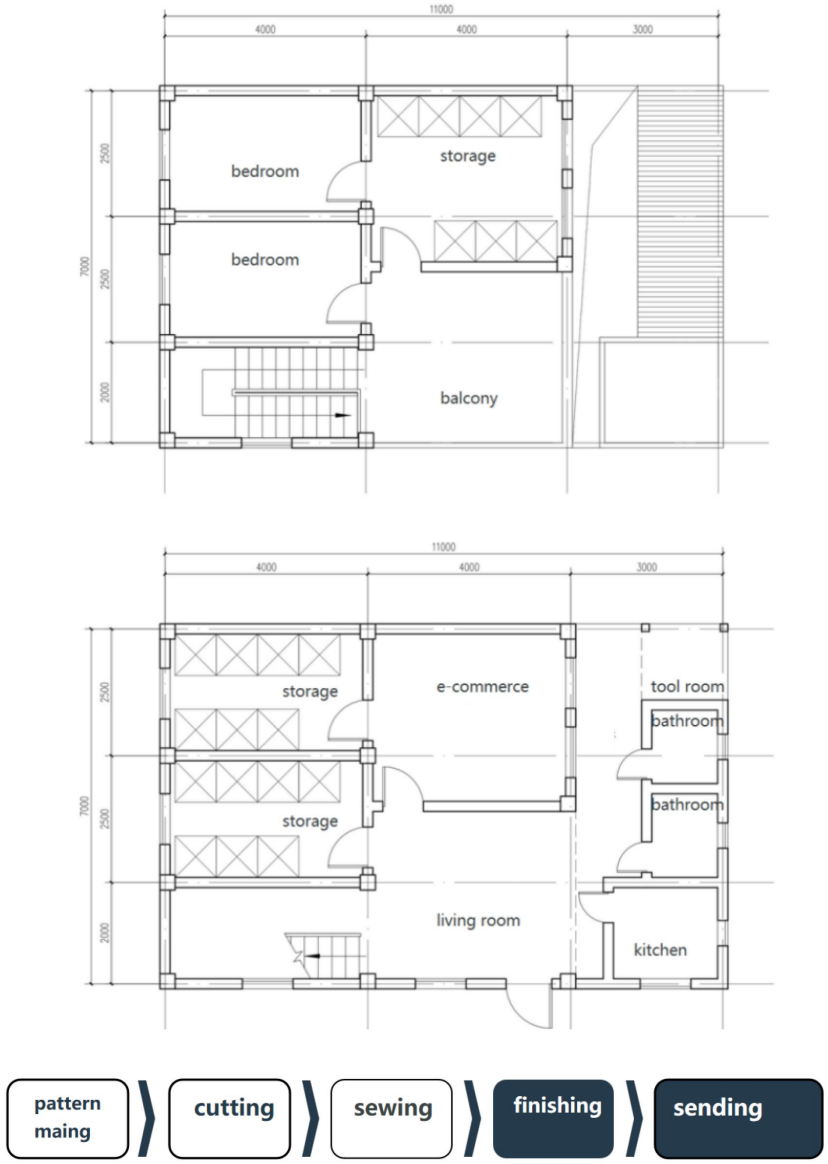


Fig 2-11 Layout of medium size garment production unit type and the garment making processes it contains. (source: the author)

Fig 2-12 Layout of minimum space type for all production steps (source: the author)

In production units that accommodate all garment-making processes except pattern making, the spatial layout can be roughly divided into three main functional zones:

Cutting Area: This zone is designated for cutting fabrics, with cutting table lengths ranging from 2.5 to 10 meters and widths under 2 meters. To allow for sufficient operating space and storage for goods, the short side of the garment production unit should be at least 12 to 15 meters wide, depending on the span of the main columns.

Sewing Area: This zone houses sewing machines, overlock machines, and other equipment, with its size matched to that of the cutting area. Typically, the area ratio for capacity matching between the cutting and sewing zones is between 1:1 and 1:2 to facilitate efficient handling of fabric and finished products.

Finishing Area: This zone is used for ironing and packing finished products.

Additionally, storage areas for goods and raw materials, office spaces, and traffic corridors need to be included.

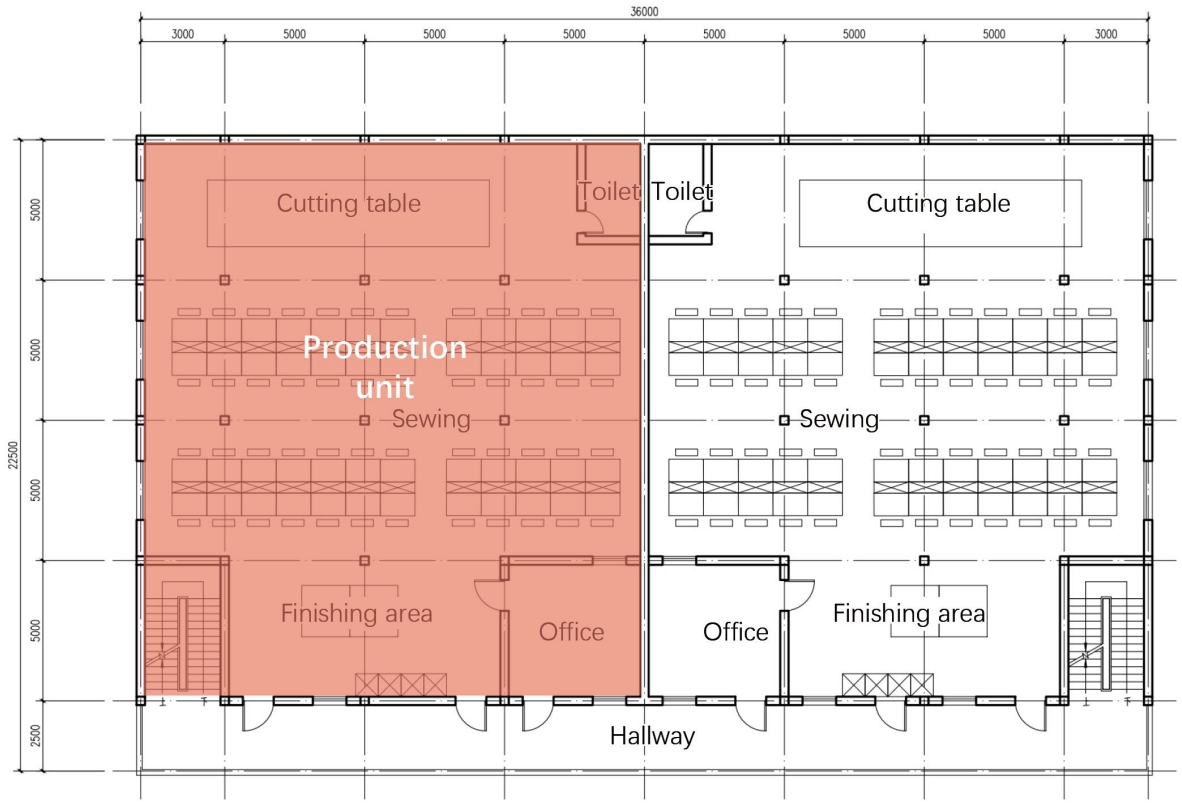


Fig 2-13 Spatial layout and division of function of production space of a certain scale (source: the author)

Fig 2-14 Interior of production space of a certain scale (source: the author)

To ensure a smooth production process, the cutting, sewing, and finishing steps should ideally be located within the same space. This arrangement allows workers to move quickly between different steps during peak production times, enhancing efficiency. Such production units can accommodate 10 to 30 workers, meeting the order volume requirements under the "small batch quick return" model. If the production unit is too large, it may lead to inefficiencies that contradict the requirements of small batch production, resulting in excessively high operational costs. Conversely, if the unit is too small, it may lead to overcrowded production spaces, causing chaos during peak periods, or only accommodate a very limited number of garment-making steps. Therefore, a garment unit measuring 15 meters in width and 20 meters in length, totaling 300 square meters, can serve as a reasonable production unit for single orders under the small batch quick return model. The Fig 2-14 shows the current interior status of the garment unit, with most garment rooms in the area also falling around 300 square meters in size.

2.4.2 Research on the Types of Production Space of a Certain Scale

The most common space type in Kanglu Garment Making Village, as previously mentioned, often involves multiple units merging horizontally and vertically to form large-scale garment factories. These factories exhibit the following characteristics:

Scale: The length of the garment factories ranges from 20 to 80 meters, with widths varying from 12 to 30 meters, typically comprising 2 to 5 floors.

Traffic Facilities: Usually, there are 1 to 4 staircases serving both freight and pedestrian traffic, with their positions determined by specific circumstances. Very few factories are equipped with elevators to facilitate the movement of goods and personnel. Generally, there is no dedicated unloading space; if there are vacant areas on the ground floor, they may be temporarily used as loading and unloading zones. Most unloading activities occur roadside, with manual transportation to various floors.

Functional Layout: The functional layout on the ground floor varies based on the factory's location and purpose. However, the layout on the second floor and above remains largely unchanged, primarily connecting different garment rooms via a corridor on one side. A

floor plan is illustrated in Fig 2-16. Due to order demands and production scale limitations, each room typically functions as an individual garment factory, with widths generally not exceeding 25 meters. Larger factories may occupy an entire floor for production.

Facade Design: The facade may feature open corridors, long windows, or standard openings.

Space Utilization: Each unit usually operates as an independent garment factory to meet specific order requirements, with widths typically not exceeding 25 meters to ensure optimal space utilization. Larger garment factories may occupy entire floors for their production activities.

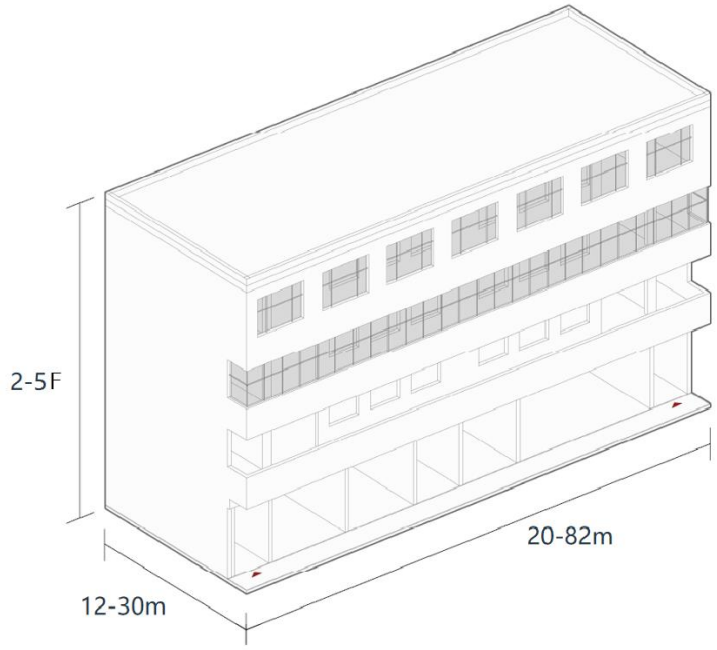


Fig 2-15 Prototype of garment production building (source: the author)

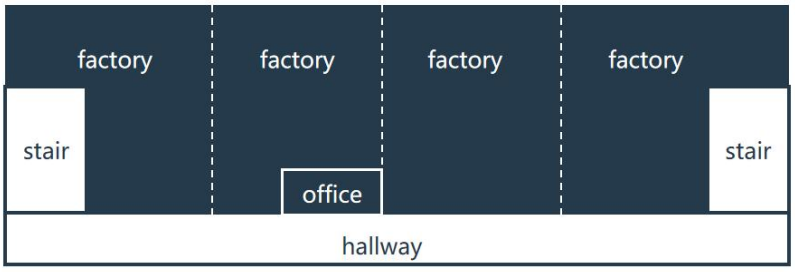


Fig 2-16 Schematic plan of garment production building (source: the author)

This type of garment factory of a certain scale can be further divided into four main categories based on location and orientation. Overall, large-scale production is concentrated along the east-west main roads and on both sides of Lujiang South Street, extending vertically into the urban village. Smaller workshops, primarily for residential purposes, are present in the village, most of which are illegal constructions or renovations. The study of the five types is outlined below.

Fig 2-17 Distribution map of four types of garment factories along main streets in Kanglu Village (source: the author)

1. Production Space Adjacent to Main Street: These are primarily found on both sides of Lujiang South Street, with vertical access to the main road, and the ground floor is used for commercial purposes. Loading and unloading goods often cause traffic congestion. Production spaces with short edges facing the main street are located along Kanglu Nanyue New Street and Kanglu Zhongyue South New Street, with vertical access to side alleys.

2. Production Space Adjacent to Secondary Streets: These are arranged along secondary

streets perpendicular to the main street. The ground floor is not used for commercial purposes due to low foot traffic, and these secondary streets are often dead ends.

3. Industrial Park Model: This model is represented by only two sites, located on both sides of the northern section of Lujiang West Street. They can be seen as two previously mentioned prototype buildings combined back-to-back. The ground floor is used for storage or garment production and is often equipped with kitchens for staff. There is a unified entrance and exit, often with a freight elevator.

4. Production Space Combined with Market: The only instance of production space integrated with a market is near the intersection of the two main axes. The ground floor serves as an open market for the entire area, while the second and third floors house the garment factory. This type consists of two prototype buildings combined, with the ground floor connecting to form a free market, topped with an aluminum roof.

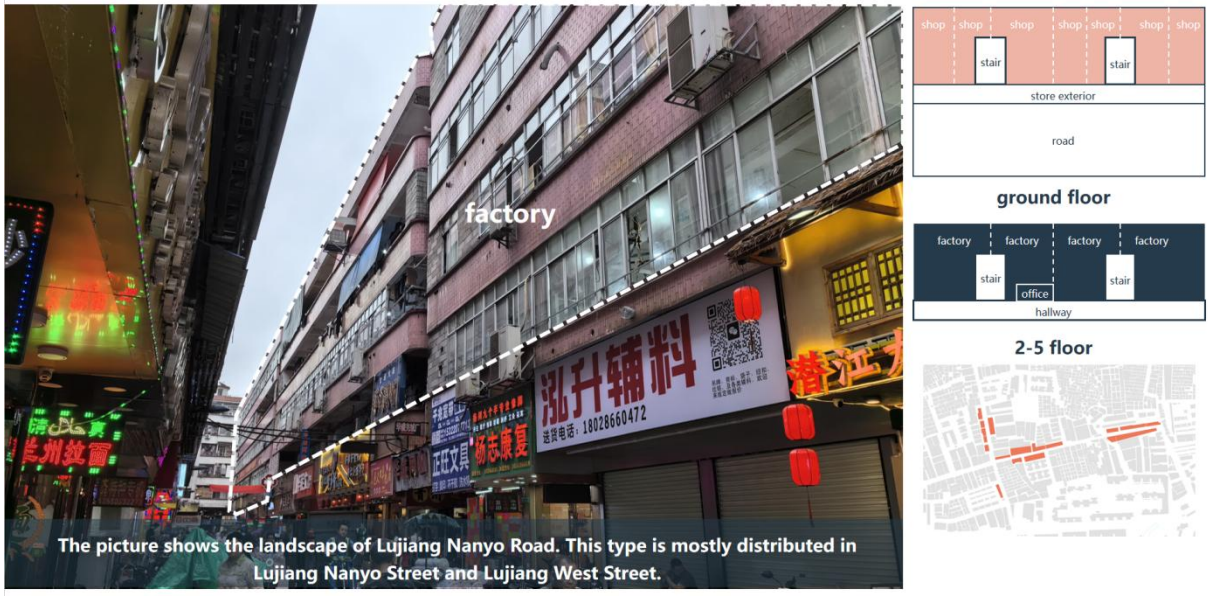


Fig 2-18 Production space adjacent to main street (source: the author)

Fig 2-19 Production space adjacent to secondary streets (source: the author)

Fig 2-20 Industrial park model (source: the author)

Fig 2-21 Production space combined with market (source: the author)

2.4.3 Transportation Space

The Zhongda Textile Business District has spontaneously formed and developed over the past two to three decades, yet it still lacks a well-planned urban road network system to meet logistics needs, resulting in significant traffic pressure in the area. The four main roads—Xinjiao West Road, Guangzhou Avenue, Xinjiao West Road, and Dongxiaonan Road—experience heavy traffic flow but currently offer low service levels. Moreover, the area has few external access points, leading to an awkward situation where vehicles struggle to both enter and exit. For example, the intersection of Ruikang Road and Yijing Road is known as a traffic "black spot" for the Zhongda Cloth Market, where congestion can reduce travel speeds to as low as 5 km/h.

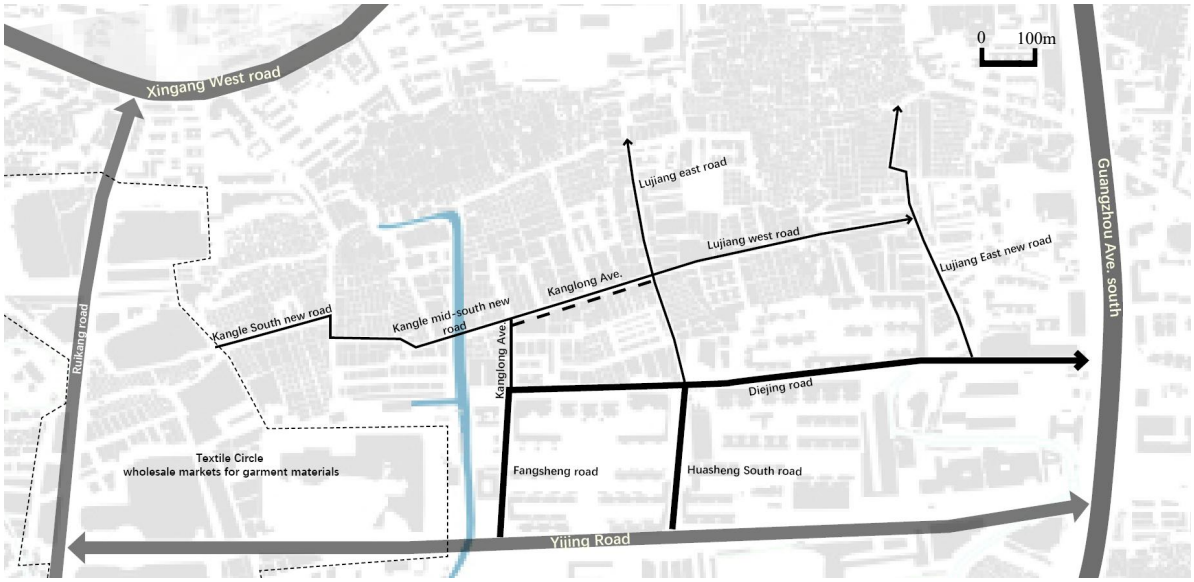


Fig 2-22 Main roads in and around Kanglu Village (source: the author)

Traffic on the main road in Kanglu Village exhibits tidal patterns during peak purchasing periods. Typically, peak purchasing occurs between 3 PM and 7 PM, maintaining high logistics intensity between the garment village and the textile market. The logistics flow can be roughly categorized into two directions: either directly entering the main road of the garment village via Kanglu Nanyue New Street or Kanglu Zhongyue South New Street, or circumventing congestion by taking Yijing Road, Fangsheng Street, or Huajing South Road, then entering the garment village through Lujiang West Street, Kanglong Street, or Lujiang Dongyue West Street. Notably, the dashed portion of Kanglong Street is currently a pedestrian street from 6 AM to 6 PM, prohibiting vehicle access.

There are six types of logistics methods within the site, as shown in the figure, with electric vehicles being the dominant mode. Small box trucks and pickup trucks are mostly seen within the textile market. Four-wheeled handcarts and modified tricycles are common on the main road of the garment village. Electric vehicles are nearly ubiquitous, especially in narrower alleyways where they demonstrate their advantages. In addition to their flexibility and convenience, the small-batch quick return model results in low daily transport volumes for garment factories, making the hiring of professional logistics services prohibitively expensive. Thus, electric vehicle transport is the most prevalent in Kanglu Village. Regardless of the transport method, they all require fabrics of a basic size, typically ranging from 1.5 to

1.8 meters. This dimension not only meets transport requirements but also aligns with the basic size of cutting tables.

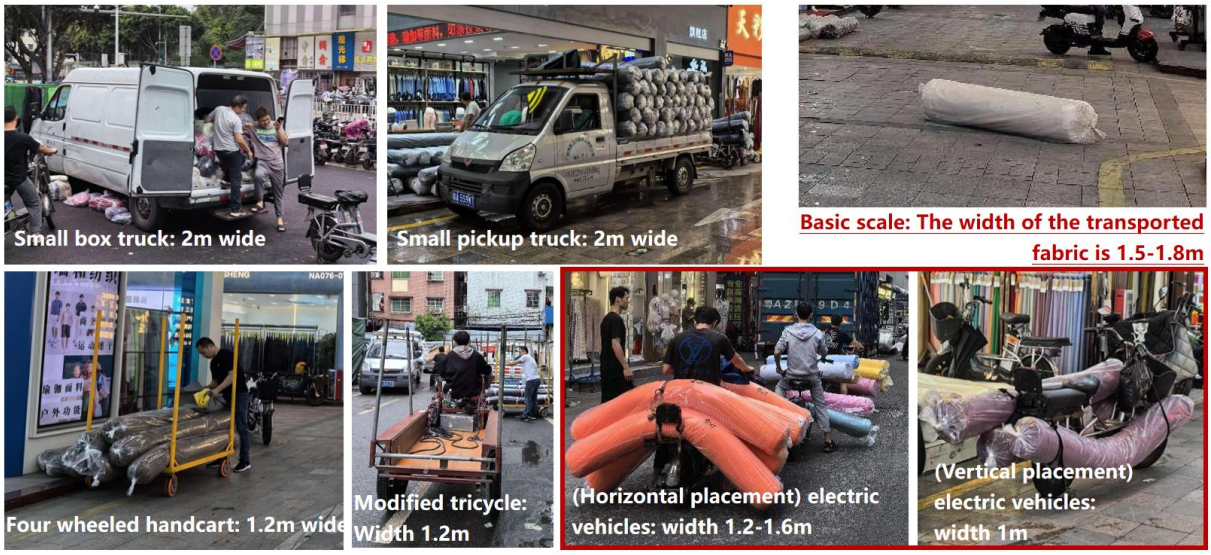


Fig 2-23 Six types of logistics methods within the site (source: the author)

The current road system in Kanglu Village does not fully meet transportation needs, often leading to congestion during peak periods. An analysis of the profile of the main road in Kanglu Village shows that the road width gradually narrows from Kanglu Nanyue to Lujiang Nanyue Street, with the height-to-width ratio increasing. Kanglong Street is the narrowest, and it is the only area within the site where motor vehicle access is restricted for certain times. Although the main road consists of two-way single lanes, the absence of pedestrian walkways in certain sections, combined with on-street loading and unloading, frequently results in one side of the road becoming blocked.

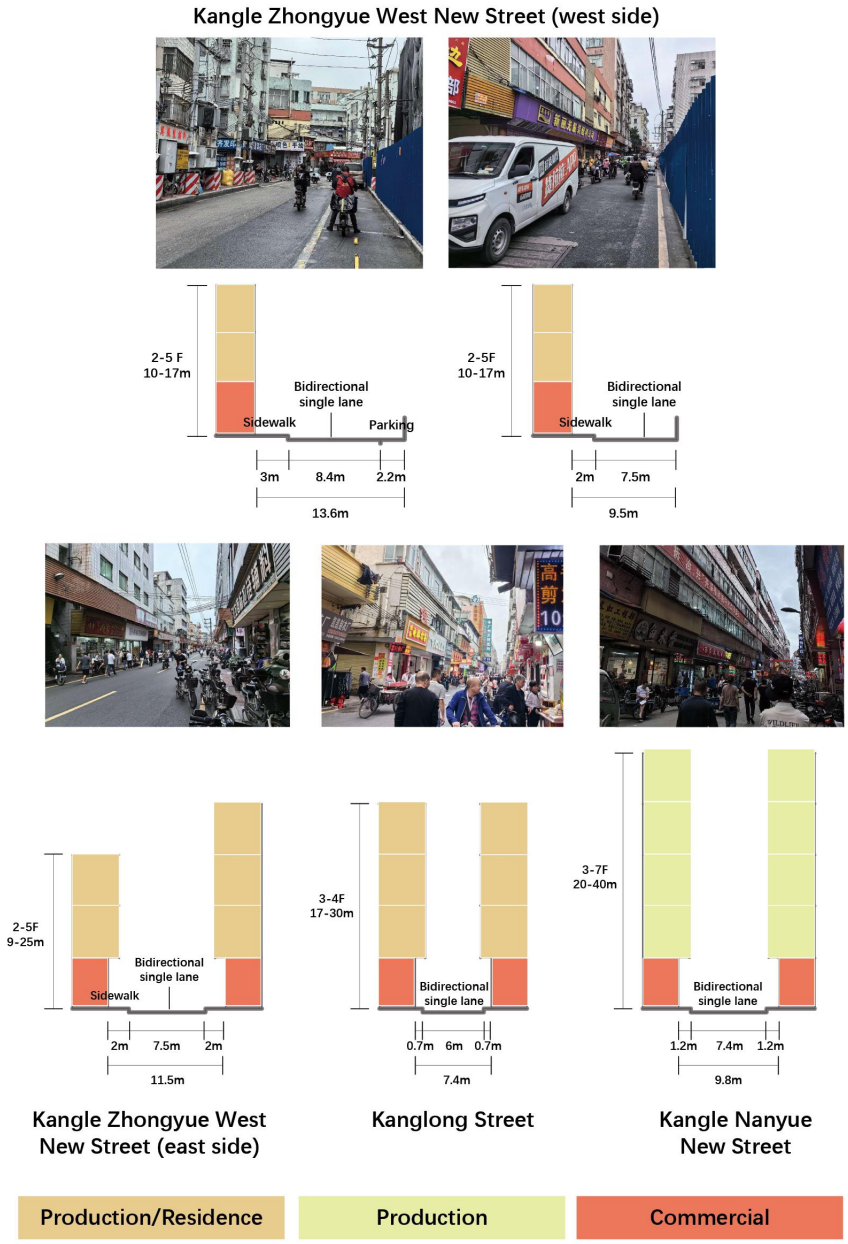


Fig 2-24 Sections and pictures of main streets in Kanglu Village (source: the author)

2.5 Summary and Outlook on the Renewal of Kanglu Garment Village

2.5.1 Population Crisis

The population crisis in Kanglu Village reveals itself through two primary dimensions that significantly impact the community. Firstly, the home-place based community is characterized by a loosely organized structure, comprising many vulnerable groups undergoing profound transformations. A notable aspect of this demographic is the high concentration of individuals from Hubei; however, the community suffers from a lack of

cohesive leadership to advocate for their collective interests. Many residents have secured long-term leases for their factories, but as urban renewal progresses and living costs rise, they find themselves at the greatest risk of displacement. This precarious situation jeopardizes the sustainability of the home-place based community, which has traditionally served as a cornerstone for the small-batch quick return model, relied upon for its agility and responsiveness to market demands.

Secondly, Kanglu Village experiences significant labor mobility, compounded by an ongoing demand for workers in the garment industry. The combination of harsh living conditions and the allure of attractive wages during peak production seasons incentivizes many workers to seek short-term employment opportunities, often leading them to quickly transition to other industries once they have secured their earnings. This dynamic creates a highly transient labor force, as illustrated by the transformation of a once-quiet sports field into a bustling recruitment market, teeming with activity each morning. In this competitive environment, companies increasingly prioritize hiring couples, a strategy aimed at minimizing turnover and fostering a more stable workforce. This reliance on dual-income households not only reflects the urgency of filling positions but also underscores the challenges of creating a sustainable labor market in an environment marked by instability and uncertainty.

2.5.2 Production Space

The organization of production space is overly simplistic, with high density between factories and poorly designed internal circulation. The garment building accommodates only the processes from cutting to dispatch, leading to a lack of diversity in operations. As previously mentioned, while the functionality of the ground floor varies based on location, the organizational logic for the second floor and above remains largely consistent. Additionally, the excessive density between factories results in poor lighting and ventilation in some areas, posing fire hazards. In terms of logistics, the use of stairs for both personnel and goods leads to inefficiencies; some staircases designated for emergency evacuation are cluttered with goods. This not only hampers vertical logistics efficiency but also raises fire safety concerns. Furthermore, most factories lack designated loading and unloading areas, frequently causing

traffic congestion along the main road. To address vertical transport issues, some garment factories have installed lifting devices outside the windows or balconies to move goods directly from the roadside to the factory. However, this method requires someone on the upper floor to receive the goods, posing a risk of injury to passersby if items are not securely handled.

Fig 2-25 Vertical transportation methods in Kanglu Village (source: the author)

2.5.3 Transportation and Public Space

Kanglu Village suffers from unclear zoning in its road profiles, making the existing road network inadequate for supporting logistics within the area. There is also a lack of quality public spaces. Some storefronts have narrow outdoor displays that encroach on pedestrian walkways, leading to significant pedestrian-vehicle mixing. The riverbank area serves as a gathering spot for public activities within the village; despite the presence of a recruitment market, many workers and business owners prefer to solicit orders and hire people in this high-traffic zone. Additionally, riders and villagers often rest in the shade by the river, but these activities frequently obstruct the roadway, causing further congestion. Therefore, there is a need to optimize public spaces in the village to enhance their quality.

2.5.4 Opportunities for Upgrading Industrial Models

Small and medium-sized garment factories find themselves squeezed between

specialized international textile markets and the internet marketplace, and they should pursue localized upgrades to align with upstream and downstream businesses. The international textile market is categorized and tiered, featuring high service levels and superior management practices. The internet, as the demand side, requires the manufacturing side to respond promptly and maintain adequate production levels. While small and medium-sized garment factories maintain good cooperation with upstream suppliers in the vertical production chain, their relationships tend to be weak and disconnected, resulting in low single-order volumes but high overall traffic intensity in the area. Thus, there is a need to introduce a role for information coordination to improve the efficiency of procurement, transportation, and order management within the site.

The success of the cross-border e-commerce platform Shein may offer some insights. In recent years, Shein has rapidly risen to prominence through its "small-batch quick return" model, competing with other international giants in the industry by leveraging its speed advantage—faster market response, shorter shipping times, and more frequent new releases. This "small-batch quick return" production model enables Shein to complete the entire process from design to shelf in just seven days, even quicker than Spain’s fast-fashion giant Zara by a full week. A key factor in Shein's rapid turnover and production speed is its collaboration with primarily small and medium-sized garment manufacturers. According to data from Shein's suppliers, the average order depth is 180 pieces per order, with many small orders ranging from 100 to 300 pieces, and the delivery time for almost all orders is between 3 to 10 days, regardless of whether it's a first or repeat order. This means that in the garment manufacturing process, the "small-batch quick return" model demands that garment factories can accept small orders at any time, with extremely tight deadlines, requiring the entire process of design, sampling, processing, and sales to take no more than two weeks—often as little as seven days[37].

The factories partnering with Shein are mostly small and medium-sized manufacturers that do not need to focus heavily on scheduling and can arrange production more flexibly. One major reason for Shein's rapid rise and global popularity is its reliance on Guangzhou's

largest textile and apparel business district, particularly a plethora of small and medium-sized garment factories, which fully exploit the competitive advantage of the "small-batch quick return" model, effectively creating industry barriers that pose challenges for new entrants. Shein's success is rooted in its establishment of a robust flexible supply chain system, with its foundation being a creative and integrated approach to collaborating with numerous garment manufacturers.

2.5.5 Outlook

The guiding opinions on the proactive and steady advancement of the renovation of urban villages in super-large and mega cities state that, based on urban industrial development planning, it is essential to reasonably arrange industrial layouts during the transformation of urban villages, introduce high-quality industrial projects, and promote industrial transformation and upgrading. Additionally, a certain proportion of low-cost entrepreneurial spaces should be provided to meet the entrepreneurial needs of small and micro enterprises as well as individual businesses. Kanglu Village has developed its own organizational principles and vibrant vitality over decades, leveraging its geographical advantages to provide low-cost living spaces for the urban immigrant population, aligning with future industry development trends. Therefore, this article aims to explore methods for preserving and enhancing the "small-batch quick return" model based on its industrial mechanisms and spatial requirements.

2.6 Summary of the Chapter

This chapter primarily examines the basic overview and key development issues of Kanglu Village. It focuses on the industrial chain of the "small-batch quick return" model, its manufacturing spatial forms, and the social structure supporting its development. Additionally, it concludes that the order depth of "small-batch quick return" determines the fundamental spatial scale of production units in Kanglu Village. Finally, the chapter summarizes the issues and development opportunities from the perspectives of population, production space, transportation, public space, and industrial models, providing a theoretical reference and basis for the subsequent design of functional units.

Chapter 3 Theoretical Study on "Small Batch Quick Return" Mixed Units

The theoretical research is divided into two main parts. The study of "small-batch quick return" mixed units references neighborhood unit theory and discusses the basic design principles of production-residential integrated communities from seven fundamental dimensions. The open block theory provides design methodology guidance, using blocks as the basic design object, addressing how to create pleasant, diverse, and distinctive neighborhoods in four aspects: block scale, internal street layout, streetscape, and individual buildings.

3.1 History of Mixing of Production and Living form

The earliest large-scale production-residence mixed-use forms can be traced back to the Industrial Revolution. As urban industrialization accelerated, an increasing number of workers migrated from rural areas to cities. New factories and slums emerged, accompanied by various chronic urban issues: air and water pollution, overcrowded living conditions, excessive working hours, fire hazards, and the spread of infectious diseases. Starting from this development point, a series of urban design theories and practices aimed at separating living and production spaces on various scales were proposed in pursuit of fairer, healthier, and more efficient working environments.[38]

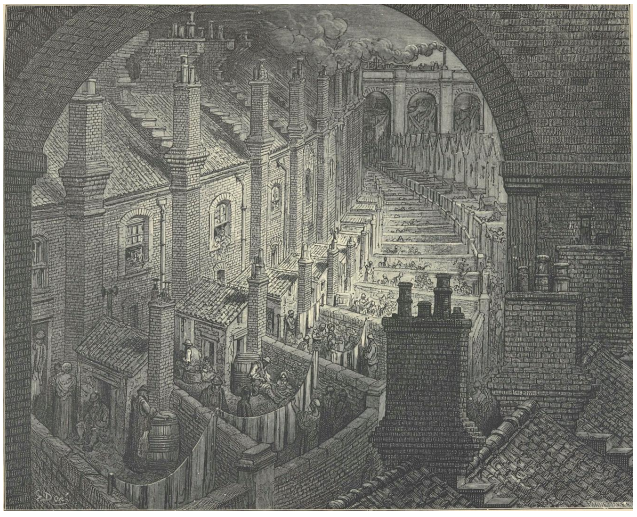


Fig 3-1 Mixing of production and living form during industrial revolution (source:Gustave Doré)

In 1898, Ebenezer Howard introduced the concept of the Garden City, which became one of the classic references for subsequent urban planning efforts. The Garden City employed concentric circles to organize different functional areas. From the center outward, these included a central park, the Crystal Palace of shops, residential areas, green spaces, schools, and churches, while potentially polluting factories and warehouses were placed on the city's outermost ring. Six tree-lined boulevards radiated outward from the central point, connecting different functional zones for the flow of materials and people. Covering an area of about 1,000 acres, this project was one of the earliest attempts to separate living and production functions on a city scale and envisioned an ideal community life system.

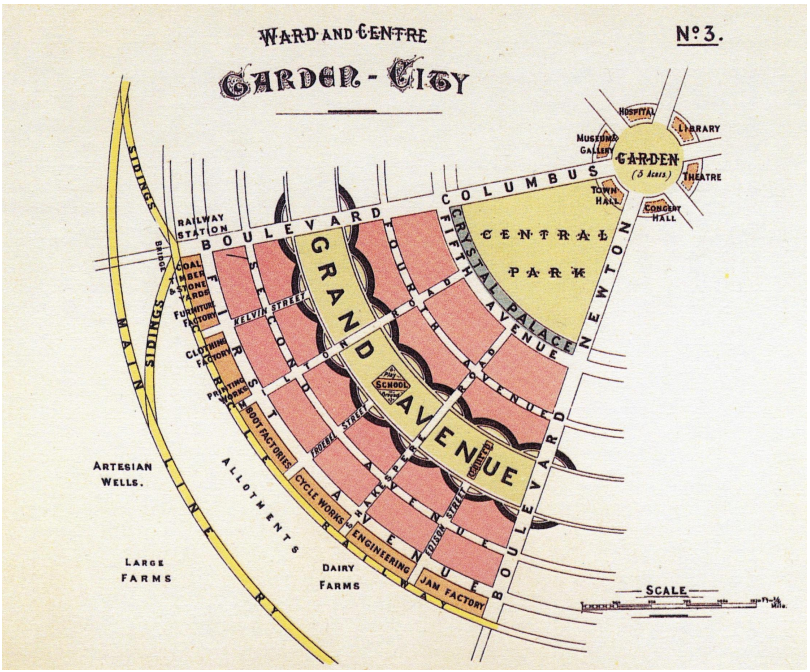


Fig 3-2 Mixing of production and living form of Garden city (source:Ebenezer Howard)

With the advent of Fordist production models in the 20th century, production-residence integrated communities underwent further development. Unlike Howard's holistic city concept, these communities were often designed by single or joint development entities, with the community's basic scale determined by the size of the company's production operations. These communities featured stable residential populations and clear physical boundaries. A notable example is the 1914 design of Port Sunlight. This community not only included complete industrial infrastructure such as freight ports, transportation roads, warehouses, and production workshops but also provided comprehensive residential and living spaces for its

workers. The residential areas were separated from manufacturing zones and, influenced by the Garden City model, were closely integrated with green landscapes. Community building relied on public structures such as churches, libraries, auditoriums, and clubs, alongside essential public facilities like schools, post offices, gyms, and hospitals.[39]

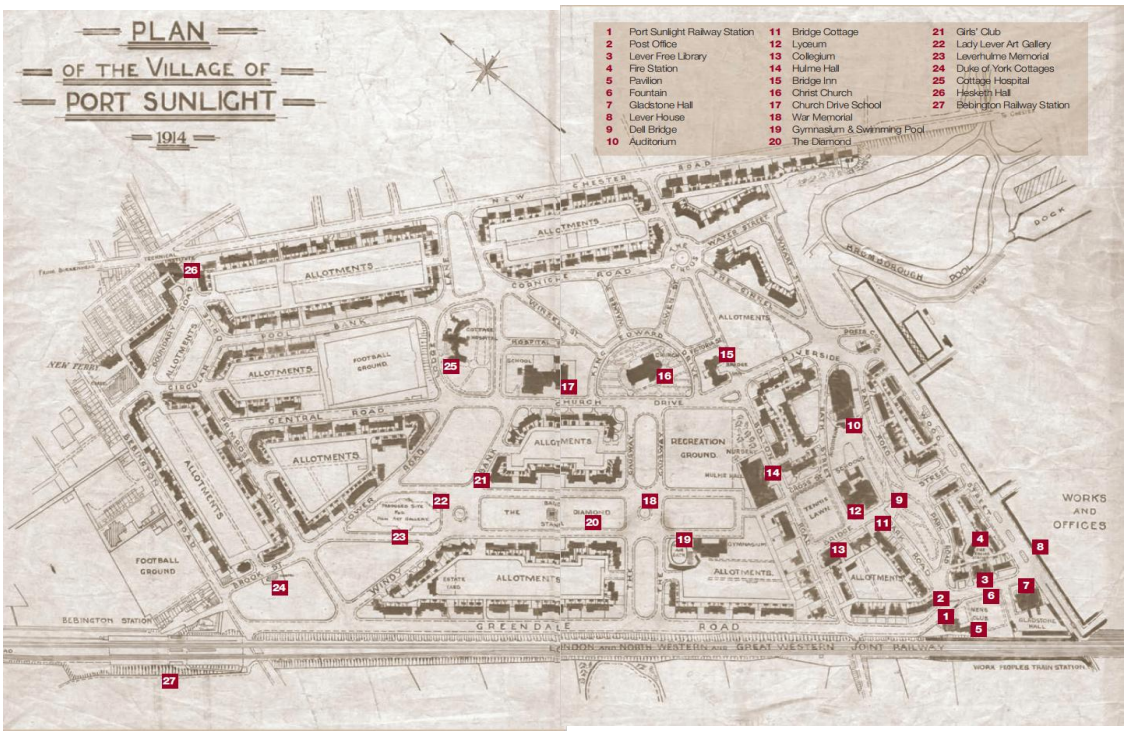


Fig 3-3 Mixing of production and living form of Fordism (source:UARM)

In the post-Fordist production model, the production-residence mixed-use model further transformed. Development entities, methods, and material and information flow systems all evolved, moving away from the traditional, unified, large-scale, and one-time completed visions of the past. However, the urban fragments spontaneously formed under the post-Fordist model faced issues strikingly similar to those encountered during the Industrial Revolution, such as fire safety and sanitation.

Addressing how to guide urban development from disorder to a certain level of order while meeting the demands of productivity growth, and ensuring the quality of life in residential areas within the production-residence mixed context, remains an urgent challenge. This paper will thus integrate the historical review of production-residence integration and the neighborhood unit theory. By drawing on the former's exploration of production-residence spaces and the latter's multidimensional visions of community life and design, it proposes a

mixed-use community model under the context of post-Fordist production.

3.2Neighborhood Units and "Small-Batch Quick Return" Mixed Units

3.2.1 Neighborhood Units

The planning concept of neighborhood units can be traced back to urban development in the United States during the 1920s and 1930s. At that time, the automobile gradually became the dominant mode of transportation, leading to urban expansion and widespread suburbanization. This urban construction model, while meeting the middle class's desire for a better life, also brought about a series of issues, such as significant land resource waste and the loss of individuality in suburban aesthetics. In response to the problems associated with urban sprawl, planner Clarence Perry proposed that "the cell city is a product of the automobile age." In his 1929 book, The Regional Plan of New York and Its Environs, he detailed what he believed to be a rational urban planning approach for the automobile era, namely the neighborhood unit concept.

Perry identified six dimensions to control the neighborhood unit community: scale, boundaries, open spaces, public facilities' locations, stores, and street systems. The scale of the neighborhood unit is derived from the reasonable size of a 400-student elementary school, which determines the number of families within the community, thereby influencing the overall community size. Spatially, the neighborhood should be manageable within a five-minute walk from the center to the edges. The community's boundaries are clearly defined by major urban roads. Open spaces and public facilities are centrally located to ensure good accessibility, often forming a spatial layout where public facilities and schools encircle a central civic plaza. Stores are positioned around the neighborhood to serve adjacent communities. The street system distinctly separates vehicular and pedestrian traffic, predominantly featuring a circular layout to reduce vehicle transit through the community, with a focus on calmness and pedestrian-friendly environments[40].

Although Perry's community design and control methods emerged nearly a century ago in the U.S. and have their limitations and historical context, the six basic dimensions he

discussed essentially address the aspects that need to be considered and controlled for a pleasant community. Therefore, these principles can serve as the foundational starting point for proposing the "small-batch quick return" mixed units in the garment sector[41].

Fig 3-4 Schematic diagram of neighbourhood units（source：Perry, Clarence Arthur, 1929）

3.2.2 "Small-Batch Quick Return" Mixed Units

Before conceptualizing the ideal "small-batch quick return" mixed unit, it is crucial to examine the economic and social context surrounding its development, particularly the transformative changes introduced by the post-Fordist production model. Post-Fordist production represents a departure from the traditional Fordist approach, which is defined by centralized production dominated by a singular entity focused on mass output within a clearly defined industrial center. In contrast, post-Fordist production disperses the industrial chain across diverse industrial spaces throughout the city, fostering close information and material connections that culminate in a new industrial spatial structure.

The characteristics of post-Fordist production can be encapsulated in three key points.

Firstly, there is a trend toward production specialization. As global production evolves, industries are increasingly adopting refined divisions of labor, moving away from the traditional all-in-one enterprises that handled research, design, and production. Instead, firms are now achieving specialized production through strategic outsourcing and collaboration, allowing for enhanced efficiency and expertise in specific areas.

Secondly, production networking plays a vital role in this new paradigm. The outsourcing and clustering of production necessitate strong interconnections among enterprises. Small and medium-sized enterprises often form dynamic alliances based on their respective specializations, leveraging collective strengths to foster innovation and expand market reach. This collaborative network of specialized enterprises enhances resilience and adaptability in an ever-changing market landscape.

Thirdly, the nature of production is becoming increasingly flexible. The contemporary consumer market, especially in the apparel industry, is shifting toward personalization and diversification, demanding a consumer-centered approach to production. This necessitates an effective integration of mass production techniques with custom production capabilities, or the establishment of intelligent production lines that can swiftly respond to fluctuating market demands.

To adapt to these three characteristics of post-Fordist production, "small-batch quick return" mixed units must embody qualities of dynamism, flexibility, and decentralization. The dynamic development and flexibility of these units are essential to accommodate the continuous shifts in production scales and methods that arise from the demand for flexibility. Additionally, decentralization aligns with the networking principles inherent in post-Fordist production, allowing for more agile and responsive operations.

From this understanding, we can further explore how to manage the six dimensions critical to the design of "small-batch quick return" mixed units. These dimensions will encompass aspects such as spatial organization, production workflow, resource allocation, community integration, technological infrastructure, and adaptability to market trends. By strategically addressing these dimensions, the design of mixed units can effectively meet the

evolving demands of the garment industry, ensuring both economic viability and social relevance within the contemporary urban landscape.

Firstly, in networked production, there are no fixed industrial scales; the networked structure can proliferate within a certain range, leading to the absence of fixed boundaries. Stores are no longer confined to the edges of communities but can be placed on both sides of streets to activate street spaces. However, there exists an optimal ratio of production to residence in networked production, and this ratio is elastically adjustable due to its connection to existing urban structures. Moreover, the decentralization feature means that open spaces and public facilities within the city are no longer centralized in the community but are dispersed across different-sized blocks according to their service level and the scale of the population they serve.

The design of the road system must not only meet pedestrian needs and create pleasant street environments but also balance production and residential demands. In addition to the six dimensions, the mixed characteristics of residence and production in "small-batch quick return" units require urban structures to respond to both demands, mitigating the potential negative externalities of production on living conditions. This involves exploring reasonable mixed modes from spatial patterns to proportions.

	Neighborhood Units	"Small batch quick return" Mixed Units
Scale	Fixed Size Determined by Primary School Scale	No fixed size but optimal ratio, adjustable elasticity
Boundary	Main Urban Roads	Capable of Proliferation, No Clear Boundaries
Open Space	Located at the Community Center, Ensuring Accessibility	Decentralized, scattered across different blocks
Public Facilities	Located at the Community Center, Ensuring Accessibility	Decentralized, scattered across different blocks
Shops	edge of the community, serving adjacent communities	Located on both sides of the road, activating street space
Street System	Pedestrian priority, circumferential pattern to reduce vehicle flow	Balancing pedestrian needs with production and logistics demands
Mixing Mode		Responding to residential and production needs, avoiding negative externalities, seeking optimal proportions

Fig 3-5 Comparison of Basic Principles between Neighborhood Units and Industrial Units (source: the author)

3.3 The History and Design Principles of the Open Block Theory

3.3.1 The Birth of the Open Block Theory

The theory and design methodology of open block originated from a series of architectural practices by French architect Christian De Portzamparc[42]. It can be traced back to the Rue des Hautes Formes project completed in 1975 in the 13th arrondissement of Paris. Faced with an irregular and somewhat enclosed site nestled between shared walls, Portzamparc sought to introduce a design method that lay between traditional Cerda block planning and modernist independent high-rise housing. He opened parts that were traditionally meant to be closed off, constructing collective housing without shared boundary walls. From a plan view, the buildings within this irregular area appear independent, yet a unified design of sightlines, paving, and materials creates a cohesive street and courtyard environment. Thus, the design of Rue des Hautes Formes allows urban access into semi-private areas while ensuring the integrity of courtyards within the residential community. Portzamparc used this design to reaffirm the importance of the block: “ The scale of the

block lies between the building and the community,” connecting the individual to the collective[43].

By the late 1970s, Portzamparc’s theory of open blocks gradually took shape through his series of design practices. At this point, he had a more complete vision of open blocks: small street blocks forming a grid layout. With no shared wall structures, multiple façades of buildings can allow light, natural wind, and views to enter. Buildings and urban spaces are controlled through a unified logic centered around blocks.

The comprehensive theory of open block was proposed in 1988. With the rise of postmodernism, architectural and urban design began to pursue complexity in function and structure. The openness and pursuit of mixed functions in the control methods of open blocks aligned with this trend. Portzamparc illustrated the fundamental characteristics and some design principles of open blocks and practiced them in the urban design of the Massena district in Paris[44].

3.3.2 Basic Characteristics of Open Block

To explain the basic characteristics of open block, it is essential to relate them to the historical development of urban morphology. Portzamparc proposed three stages of urban morphological development[45].

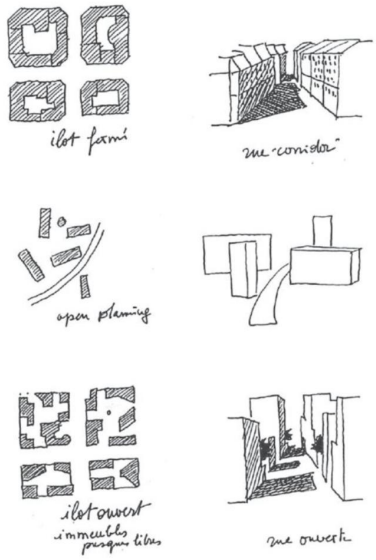


Fig 3-6 Concept sketches comparing the three stages of urban morphological development（source：Portzamparc, 2013）

The first stage is the "Haussmann block." Before the Industrial Revolution, urban blocks were densely surrounded on all sides by buildings, leaving only small openings for basic access to inner courtyards. This made it difficult to envision courtyard landscapes from the street, with each block appearing as an isolated island. This spatial form was deemed unsanitary and inefficient by early 20th-century architects and planners. Le Corbusier remarked, “Streets are unsanitary; narrow corridors should be avoided.” Thus, under the influence of functionalism and technological thinking, urban development entered the second stage. In this stage, streets were significantly widened, and uniquely expressive individual buildings were scattered along the sides of roads. Buildings detached from urban structures existed independently, and the urban spaces that should have been interrelated with buildings lost human scale and organizational principles.

The third stage is what Portzamparc proposed as the open block. The "block" emphasizes the significant form that connects building and urban scales. He combined the insights from the previous two stages to propose that morphological structure should not be solely dictated by building entities or street networks, but rather by the mediators between individual buildings and urban streets. Thus, as mediators connecting public life on streets, courtyards, and life within buildings, urban blocks are the true key factors that dominate urban morphology. As fundamental units of urban design, blocks play an irreplaceable role in maintaining the relationship between cities and individual buildings. The term “open” emphasizes the contrasting characteristic to the closed nature of the first period, where the combination of street landscapes and inner courtyard views creates an open walking experience. Overall, open blocks have four basic characteristics:

1. The buildings surrounding enclosed spaces exist as free individuals, maintaining a degree of independence from one another.

2. The independence of building entities fosters diverse design systems, allowing different zones to exhibit individuality and place spirit.

3. To create a varied urban spatial quality, the urban planning philosophy of “open blocks” does not strictly limit building heights, preventing a uniform skyline.

4. The order of classical cities often evolved from homogeneity, similarity, and standard styles, whereas our current era emphasizes heterogeneity, mixing, and contradictions.

3.3.3 Design Principles of Open Block

The open block concept largely continues the previously described perimeter block morphology, allowing for differentiation between the front and back of the block. Thus, the design principles of open blocks can be categorized into four main parts: the basic scale of the block, street-facing design, courtyard-facing design, and the relationships between individual buildings.

Fig 3-7 Schematic diagram of the design principles of open block theory (source: the author)

Portzamparc illustrated the relationship between street-facing design and individual buildings through graphic representation. Specifically, in terms of external design, the ground floor of the open block should create a positive and open boundary; the street skyline should be varied and maintain an overall rhythmic quality; to ensure visual openness, 30% to 40% of the ground floor facade should be open or set back; and the street facade should allow for a mix of diverse materials, with a continuous material used at the base if necessary. Individual buildings, due to their independence, do not need to follow traditional flat-plan generation methods; instead, they can be envisioned as situated within a "volume shell" that is slightly smaller than the constructible mass. This leads to the creation of various architectural forms oriented in four directions. This series of design principles ensures individual expression of buildings while maintaining the unity of street form and the openness of urban life.

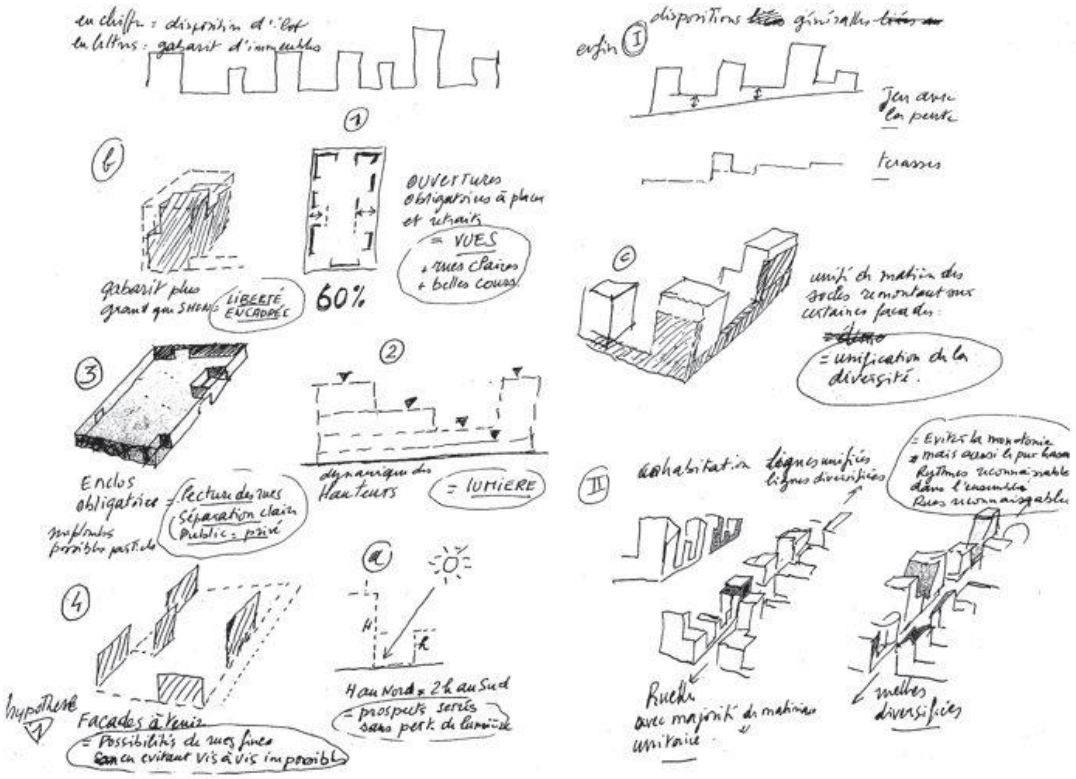


Fig 3-8 Graphic representation illustrating the relationship between street-facing design and individual buildings（source：Portzamparc, 2013）

Regarding block scale, Portzamparc did not provide explicit guidelines, only emphasizing that it should lie between the scales of architectures and communities. In his design practice, the scale of the block varies based on the surrounding road systems and project sizes. For instance, in urban design on the Left Bank of Paris, block sizes generally do not exceed 50 meters. In the residential design at Porte d'Asnières, to maintain the internal block scale of approximately 100 meters, he considered the surrounding road system.

Finally, in courtyard design, Portzamparc advocates for creating an intimate courtyard core that serves as a community public landscape or activity center. In his earliest project, Rue des Hautes Formes, he made such an attempt; although the community is situated in a fragmented site, Portzamparc still created an intimate core through paving, simple architectural elements that define boundaries, and a well-formed courtyard.

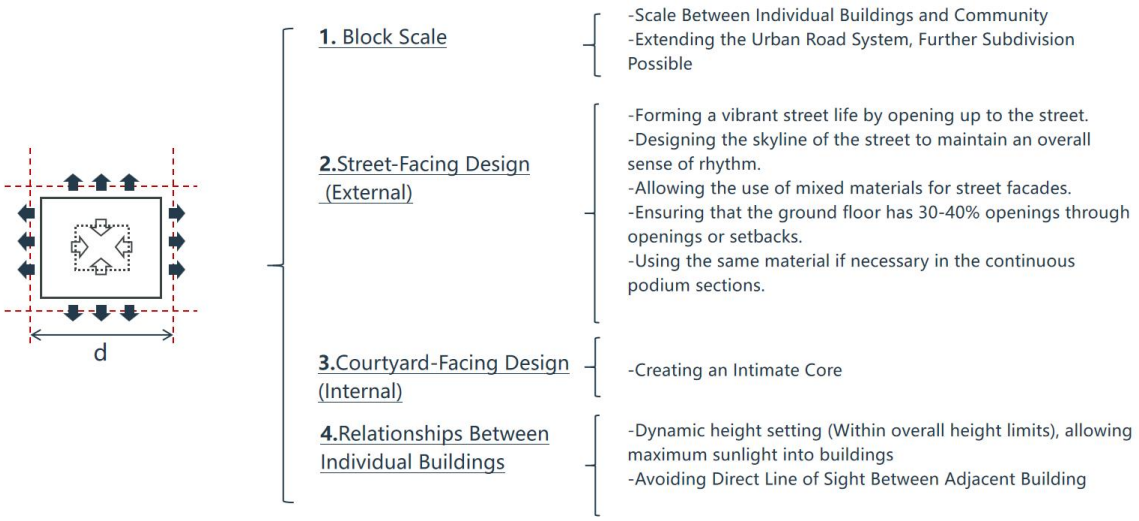


Fig 3-9 Design principles and methods of open block theory (source: the author)

3.3.4 Case Study of Open Block

(1) Development in the Massna - Grands Moulins Area on the Left Bank of the Seine, Paris

The development in the Massna - Grands Moulins area on the Left Bank of the Seine serves as an example of how urban public spaces can act as a key operational mechanism for organizing and promoting dense urban forms, thereby generating a socially vibrant community. This site was previously occupied by a railway and bus factory. The project aims to respond to the demand for diverse housing options within the narrow confines of Paris's metropolitan core[46].

In the design and development process, open blocks became the core concept and management guideline for urban composition. While the final block accommodates a variety of housing and architectural forms, all buildings feature front entrances that lead to the street network, fostering vibrant street life. Additionally, each block was assigned to a separate design studio, while Portzamparc was responsible for the design of the street block, street systems, and design guidelines. This design approach maximizes architectural diversity while ensuring the continuity of the streetscape.

Fig 3-10 General plan and pictures of development in the Massna - Grands Moulins area on the left bank of the Seine, Paris（source：Friedberg, 2019）

Traditional street "street walls" have been replaced by a variety of buildings of differing heights, creating a skyline along both sides of the street, complemented by private gardens and public landscapes as visual mediators. Landscapes, light, and vegetation can penetrate the block, creating a rich juxtaposition of public and private spaces: private open spaces are separated from the street by walls or fences, enhancing the continuity and legibility of public spaces, while the public street visually benefits from the greenery of private gardens. A series of strict geometric connections and clearly defined public spaces ensure spatial readability, providing a network of pathways that traverse residential, commercial, and institutional areas.

In the urban environment, streets have proven to be the simplest and most open forms capable of adapting over time and integrating unpredictable events. Surrounding this network structure, the additional flexibility of open blocks allows for entirely different types of

functions to coexist, providing natural light and expansive views for each facade.

Moreover, open blocks facilitate the separation of living and working spaces while making better use of shared courtyards. Residents can access the courtyard from various directions and find the entrance to their homes, as well as back doors leading to workspaces and businesses via this exterior corridor. Non-residents can easily reach shops and offices from the street. Thus, open blocks successfully mediate the diverse users of the urban environment.

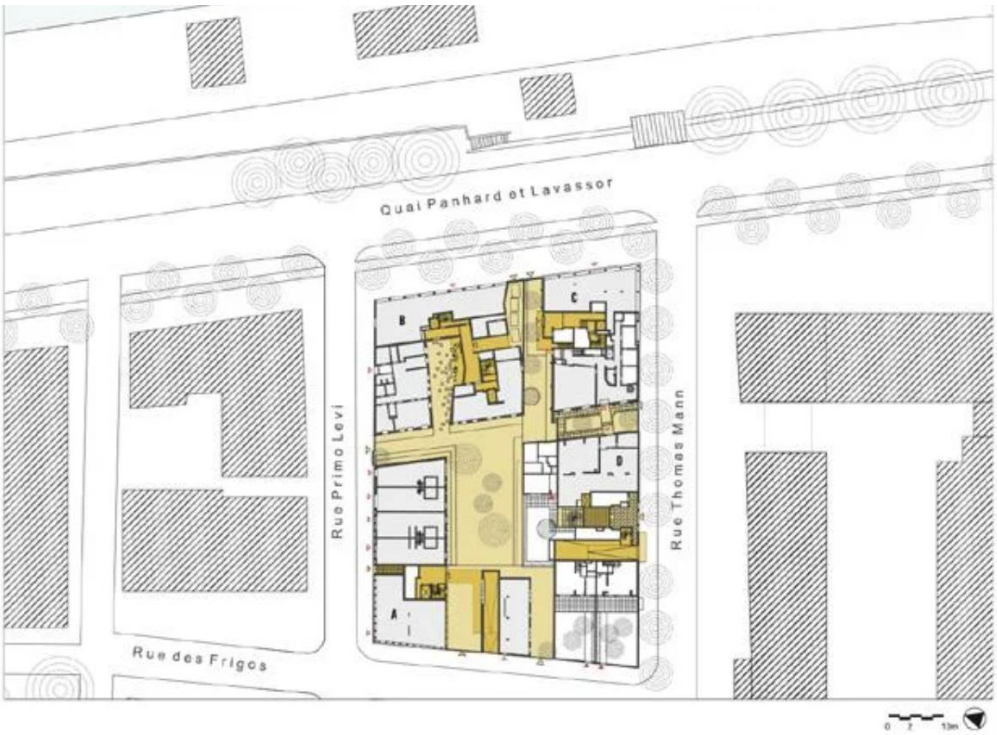


Fig 3-11 Plan of a single block in the development of Massna - Grands Moulins area（source：Friedberg, 2019）

(2) Hautes-Formes Collective Housing (Rue Des Hautes Formes, 1976)

Hautes-Formes Collective Housing (Rue Des Hautes Formes, 1976) is Portzamparc's first design practice applying the "open block" planning concept, representing the culmination of his years of research on collective housing. The French name "Hautes-Formes," meaning "high hats," refers to its location at the end of a street called "Rue des Hautes-Formes." As the name suggests, it consists of seven slender, tall buildings that enclose a complete and varied courtyard space, featuring clear neighborhood entrances, internal pathways, and resting areas.

To eliminate the monotony and oppressive feel typical of previous concrete-heavy collective housing, Portzamparc introduced distinctive Parisian street characteristics, such as paved paths, squares, and green spaces. Notably, he insisted on acquiring a small piece of land east of the street to connect the original dead-end road to the city thoroughfare, thereby integrating the residential public space more organically with the urban environment.

The treatment of the building facades is not a simple, rigid reflection of the internal layouts; instead, it considers the needs of the courtyard landscape, using it as a backdrop. The project features 18 main residential unit types and 100 variations in floor plans, ensuring that the 209 residential units differ in scale, height, viewpoints, and lighting, catering to the needs of various resident tiers.

In this project, Portzamparc employed a fragmented design approach that disperses the design across several buildings and individual spaces, aligning with his advocacy for the independence and diversity of architectural units. Starting from the theory of heterogeneous mixing, he rejected the uniformity of collective housing and aimed to reconstruct a typical Parisian urban block by deconstructing the original social housing into fragmented segments. Compared to European cities where the block is the primary structural element, this work represents a turning point in post-war community housing forms through its concepts of heterogeneous mixing and fragmentation.

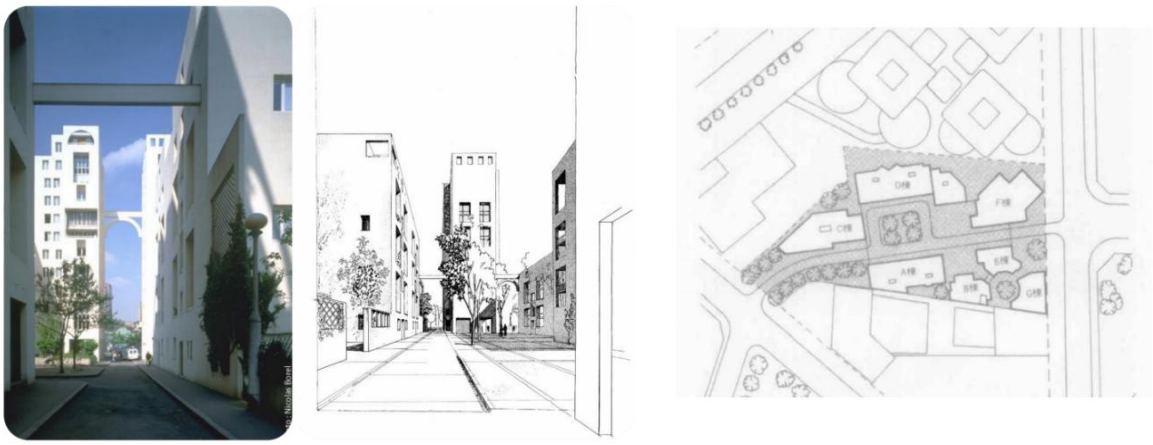


Fig 3-12 Hautes-Formes Collective Housing (Rue Des Hautes Formes, 1976)（source：Friedberg, 2019）

3.2.5 The Practical Significance of Open Block in Urban Village Renewal

The open block approach has already been used to guide urban renewal and new

construction projects in China. Due to its multifaceted nature—encompassing block scale control, façade control, and considerations of mixed-use models etc.—its application varies depending on the field, and must be discussed in relation to specific circumstances. For instance, urban renewal designs based on the open block theory in historic districts focus on preserving the original historical fabric while emphasizing the individuality and independence of single buildings. This approach aligns with the protection of various historical architectural styles that have developed through different historical periods, as well as the creation of a unified street aesthetic[47].

In the context of new urban design practices, the "block" not only serves as a fundamental unit of the city's physical structure in terms of its topological and aesthetic significance, but also functions as a basic unit of urban life, organizing city functions, and implementing policies and regulations. The theory emphasizes a return to human-centered design and the revitalization of public spaces, rather than simply removing walls and opening up previously enclosed areas[48][49].

In new residential developments, the theory has inspired a focus on scale and openness, such as the creation of "narrow blocks with dense street networks," reopening formerly gated communities to restore human-scaled urban environments. Discussions have also emerged around abandoning high-rise residential models in favor of medium-rise buildings, limiting structures to around 10 stories. This approach is expected to achieve a balance between floor area ratios, occupancy rates, and construction costs[50][51].

However, some scholars have noted that the discussion of open blocks in the context of new residential developments has its own distinct characteristics. While it aligns with the global trend against enclosed communities as identified by Portzamparc, it also has its own unique evolutionary path, which must be taken into account when applying open block theory in practice[52]. In short, while the open block model, originating in the West, is often promoted as a problem-solving tool, its adaptability to China requires a deeper evaluation of the fundamental relationships between buildings, streets, and urban spaces[53].

The open block concept, focusing on the block as a fundamental design unit, holds five

practical significances for the renewal of garment industry urban villages. First, as a design object, the block offers considerable flexibility and adaptability, accommodating the elastic development of urban villages. Second, open blocks emphasize mixing and heterogeneity, guiding urban design methods toward mixed-functionality. This can enrich the ecosystem of small batch quick return communities by introducing upstream and downstream live-stream marketing and smart design, harmonizing residential and manufacturing needs within the block. Third, it highlights the spirit of place and community building, underscoring the role of public courtyard spaces in enhancing community cohesion and providing public services, thereby improving the quality of life and retention in home-place based communities. Fourth, different blocks within a single neighborhood can be developed by various developers and designed by different architects, allowing for coordination of stakeholder interests while accommodating uncertainties and maintaining a harmonious overall form. Finally, open blocks can coordinate the heights and forms of individual buildings to ensure natural lighting and ventilation, creating a well-structured neighborhood environment.

However, the practical application of open block theory also has limitations. Issues such as how to delineate property parcels within blocks, specific design approaches for courtyards, and concrete mixed-function models have not been discussed, and the relationships between individual buildings are primarily governed by light access. In the context of this renewal practice, considerations must also include local fire and lighting regulations, the climate of the Pearl River Delta, and potential pollution from garment factories. Therefore, supplementary discussions on these key points are necessary for effective application.

3.4 Summary of the Chapter

This chapter summarizes that settlements closely integrating production and living under the post-Fordist production model should adhere to seven basic principles across two theoretical directions. By referencing the design methods of open blocks and treating the block as a fundamental design unit, it controls the morphology of blocks in four aspects: scale, internal and external relations, and the relationships between individual building

Chapter 4 Design Practice

This design practice first combines the analysis of the industrial model and issues in urban villages from Chapter Two with the theoretical research from Chapter Three to propose design goals and strategies. Next, it focuses on the prototype design of small batch quick return garment-making clusters, analyzing the mixed models of both the block and building levels based on functional unit layouts. Finally, specific design implementations will be selected along the main roads and riverbanks within the site, targeting areas that have already been demolished.

4.1 Design Strategies and Goals

4.1.1 Enhancing economic viability in mixed-use model

The competitive advantage of small batch quick return under the post-Fordist production model stems from the flexibility of its industrial chain and scale organization, along with a high degree of coordination between upstream and downstream processes, from supply-demand information to technology. Consequently, the demands for production and urban space are also diverse, mixed, elastic, and flexible. Based on the aforementioned theories, the following design strategies are proposed:

1. Allow for diverse development models. Unlike the original development model of large-scale demolition and construction by a single market entity, this approach encourages village collectives or residents to undertake independent renewal. Create a varied foundation that permits different stakeholders to participate in urban development.

2. Encourage diverse architectural designs for individual buildings. Relax restrictions on facade designs appropriately.

3. Ensure varied scale combinations based on the prototype of production units, allowing for dynamic changes according to actual needs.

4. Provide diverse residential types to meet the housing needs of various populations.

5. Incorporate mixed architectural functions related to different stages of the textile industry's upstream and downstream to stimulate their synergistic effects.

6. Design blocks to be flexible and adaptable for future development.

4.1.2 Balance between Production and Living

Although the high-paying jobs created by the small batch quick return manufacturing model attract a continuous influx of workers, the poor living conditions in urban villages and the lack of supporting services fail to retain these workers or support the further development of home-place based communities. Therefore, this article proposes a development goal of achieving a balance between production and living, creating sustainable communities that can retain residents in garment-making clusters. To achieve this goal, it is essential to establish residential support and related services that correspond to manufacturing needs. This involves tapping into the potential of home-place based communities, nurturing local networks, and stimulating interactions among diverse groups. In decentralized communities, plots of varying sizes should accommodate different levels of service facilities. Additionally, there is a need to enhance the quality of public spaces.

4.1.3 Comply with Regulations

This part aims to address a series of inherent issues arising from the chaotic development of urban villages, including fire hazards, mixed residential and commercial use, outdated logistics, and disorganized operations, thereby regulating living and production spaces. Specific strategies include mitigating the negative externalities associated with manufacturing, complying with fire safety regulations, and establishing a logistics system suited for the small batch quick return model.

The negative externalities of manufacturing primarily refer to various forms of pollution generated during production. The pollution from different production chains and its potential impacts are illustrated in Fig 4-1. The most severe pollution occurs during the auxiliary materials processing stage, including dyeing, cotton processing, denim production, and hardware processing. The water consumption and wastewater discharge from auxiliary material processing are substantial. Wastewater from dyeing factories and denim production can lead to severe chemical pollution. Additionally, noise levels from yarn winding machines can reach 85 decibels, necessitating the use of specialized ear protection for operators.

Hardware processing also poses issues with dust from metal waste. In planning and design, these areas should be zoned separately, away from residential areas and water sources. Given that the existing proportion of auxiliary material production on-site is small, and since processed materials must return to the textile market for procurement before going back to the garment village, there is no necessity for proximity to subsequent production; thus, this design does not consider auxiliary material production. The design and pattern-making stages only involve creating paper patterns and computer-generated fabric styles, which cause minimal pollution. Cutting, sewing, and finishing stages may produce minor dust and noise pollution, but fire safety is a major concern due to the potential accumulation of flammable materials. Garment processing facilities fall under Class C buildings, with varying fire safety distances of 12-16 meters between factories and 10-18 meters from residential buildings.

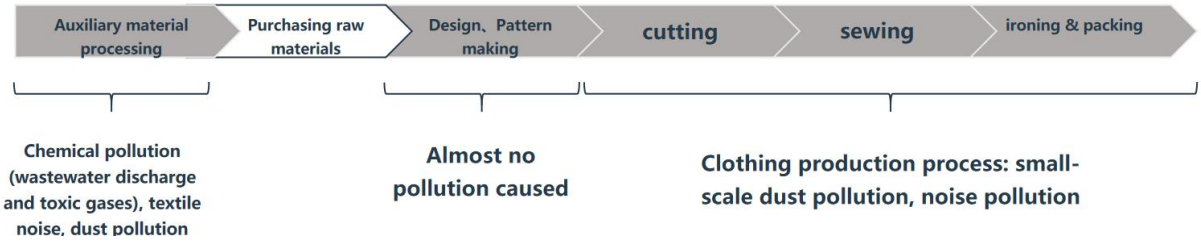


Fig 4-1 Pollution generated in different processes of garment making (source: the author)

The primary logistics objects in the small batch quick return model are raw materials like fabrics and hardware, as well as finished and semi-finished products, which can be divided into three parts. The first part involves public road transportation from the textile market to the garment factories. In the existing site, the transportation volume per trip is small, but the overall quantity is substantial, making electric vehicles the main mode of transport. In the future, e-commerce platforms like Shein or other logistics information coordination centers may consolidate transport needs within the site, improving transport efficiency and reducing logistics pressure on public roads. Correspondingly, small warehouses and internal logistics flow lines can be established to meet localized logistics needs. Goods can enter the garment factories through public roads in two ways: either small delivery trucks transport them to a public warehouse, with hand carts or tricycles accessing the unloading area via internal loops, or delivery trucks or electric vehicles directly unload at the designated area from external

roads. The second part concerns loading and unloading goods. An independent loading and unloading area should be designated to alleviate congestion and safety hazards currently caused by on-site unloading, with temporary stacking zones designed at some entry points. The third part focuses on the internal flow within the building, further subdivided into horizontal and vertical flows. The vertical flow should employ different types of freight elevators based on the transport volume, while horizontal transport can utilize hanging systems, hand carts, or conveyor belts. Typically, only medium-sized factories require additional hanging systems, while small batch quick return garment factories are often standalone buildings and small enterprises, so the focus should be on the design of vertical flow.

4.1.4 Summary of Design Principles

Based on the previously discussed theoretical research, design strategies, and goals, two main design principles can be summarized.

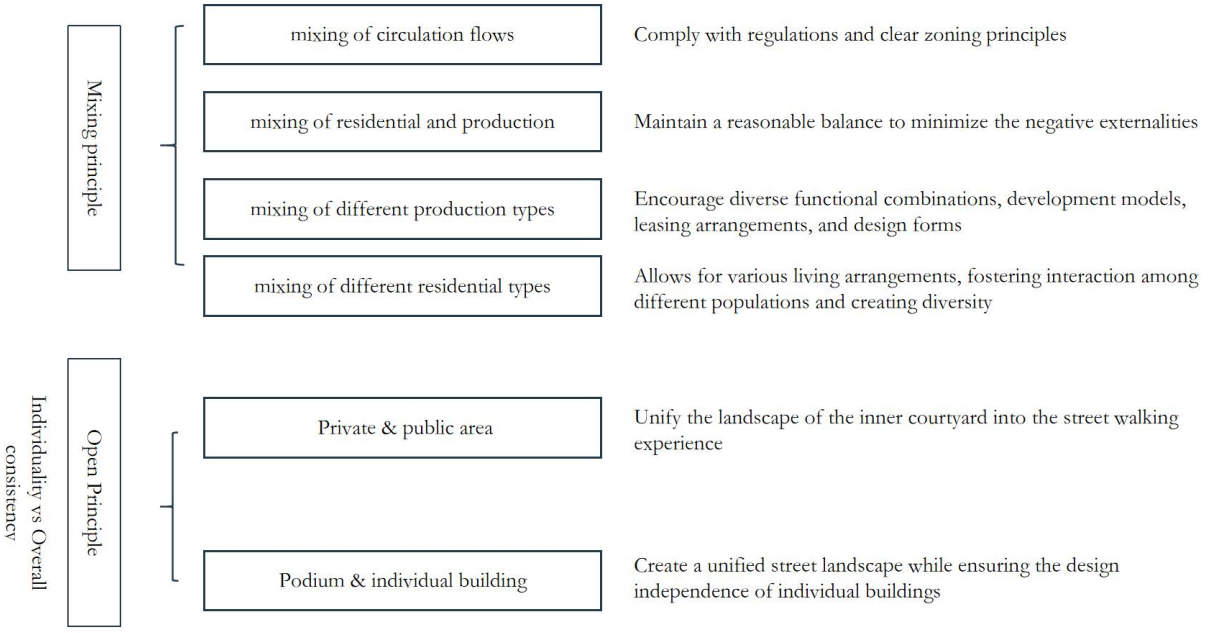


Fig 4-2 Two main design principles and their detailed rules (source: the author)

The first principle is the Mixing Principle, which encompasses the mixing of circulation flows, residential and production areas,mix of different production types, and mix of different residential types. Circulation mixing adheres to standardization and clear zoning principles,

ensuring that entrances and horizontal and vertical flows for production and living spaces are distinct. Within production areas, employee and logistics flows should also be differentiated. The mixing of production and residence should maintain a reasonable balance to minimize the negative externalities of production on living conditions. Specifically, this can be achieved by implementing adequate spacing between buildings and centralized ventilation systems to mitigate noise and air pollution from manufacturing activities. The design should also provide flexible living spaces to accommodate seasonal fluctuations in production needs. Additionally, mix of different production types encourages diverse functional combinations, development models, leasing arrangements, and design forms, all grounded in the depth of small batch quick return orders. The mixing of residential types allows for various living arrangements, fostering interaction among different populations and creating a diverse small batch quick return community. The design should incorporate private residences, dormitories, apartments, and other housing types to meet the needs of designers, workers, and factory owners.

The second principle is the Open Principle. The design should seek a balance between the independence of individual units and overall coherence. This involves balancing public and private spaces, as well as the individuality of buildings with the uniformity of the overall streetscape. The ground floor must ensure the independence of public, private, and semi-private areas while allowing for visual connectivity, integrating courtyard landscapes into the street experience. For buildings on the second floor and above, while maintaining design independence, coordination of the street skyline, facade materials, and spacing should create a cohesive streetscape.

This design focuses on the combination of residential and production functions at both the neighborhood and building scales, as well as the organization of traffic flows, in response to the aforementioned principles.

4.2 Prototype Design

The prototype design begins with the study of two fundamental functions: the spatial layout units for production and residence. Based on this analysis, the reasonable ratio of

production to residence under the balance is examined. Following this, the design explores the mixing of production and residence. This mixing is divided into mixing at block scale and mixing at architecture scale.

In the mixing at block scale, production and living functions are located in separate buildings, connected by public spaces and road systems. This section focuses on how to design an effective neighborhood system that creates a pleasant environment capable of meeting both production and living needs simultaneously. In the mixing at architecture scale, production and living functions coexist within the same structure, with distinctions made based on vertical and horizontal mixing relative to the public roads.

4.2.1 Analysis of Basic Functional Units

The basic functional units are divided into transportation space units, production units, and residential units. The layout and basic dimensions of each unit are illustrated in Fig 4-3. The vertical circulation space for pedestrians adopts different design strategies based on residence type and floor height. The unloading unit includes parking areas, unloading zones, and freight elevators, with unit dimensions approximately 4-5 meters wide and 11 meters deep. The entrances and exits for the blocks are designed according to the minimum fire escape requirements, with a width and height of 4 meters, connecting the street and the courtyard.

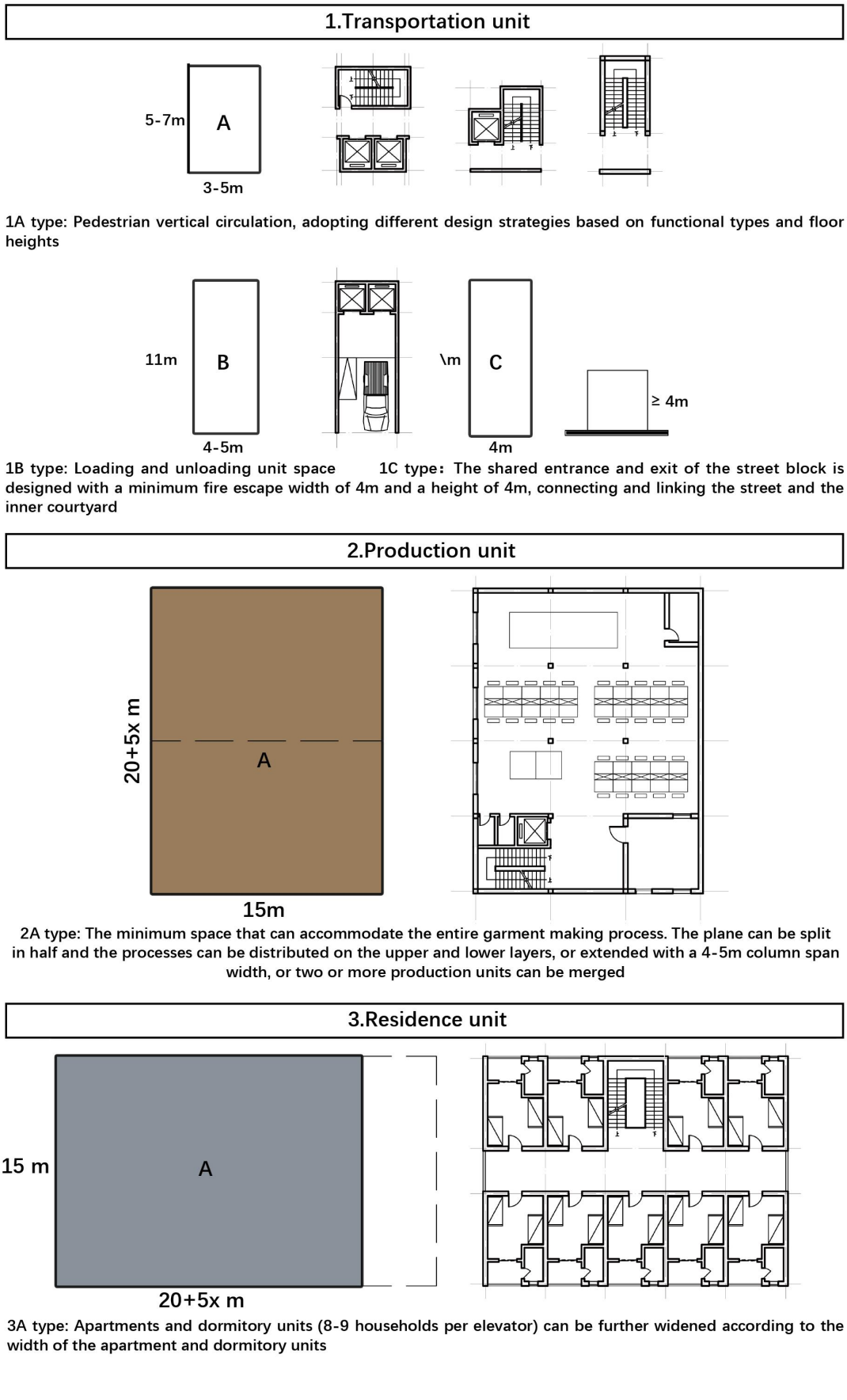


Fig 4-3 The layout and basic dimensions of transportation, production and residential units (source: the

author)

As analyzed in Chapter 2, the minimum space required to accommodate a single small batch order is approximately 300 square meters (15 meters wide and 20 meters long), allowing for 10 to 30 workers depending on seasonal demand. Based on this, production space can be expanded according to the basic column spans (4m or 5m). Each clothing making unit can independently fulfill a small batch order, and factory owners can rent multiple units for parallel production based on their development needs.

Residential units are similarly designed with dimensions of 15 meters wide and 20 meters long. The width includes 6 to 7 meters of living space and 2 to 3 meters of internal corridor. The length of the residential unit can be expanded based on individual dormitories or apartments to meet various living needs. Within this unit, 8 to 9 two-person apartments or four-person dormitory rooms can be arranged. Two-person apartments provide long-term housing for resident couples, while four-person dormitories accommodate both short-term and long-term single workers. Thus, the unit can provide a total of 16 to 36 beds. Given the number of workers accommodated in the production space, a ratio of approximately 1:1 for production and living spaces meets the seasonal housing needs. Additionally, if the owner's private residence is set at 150 square meters, the approximate ratio of production to living space should be 1:1.5, with a ratio of 2:1 between worker dormitories and the owner's residence. This arrangement considers both long-term and short-term housing needs for workers and ensures adequate living space across different production seasons.

If production units retain the original spatial model, the 300 ㎡ factory (Class C) should have evacuation stairs on both sides, with a minimum spacing of more than 5m between them for fire safety. For a Class III fire safety factory, any point inside must not be more than 40m from an evacuation stair. The basic spatial unit is as follows, with one side designated as the employee entrance module, including restrooms, exhaust shafts, and electrical shafts, while the other side functions as a cargo module with unloading space.

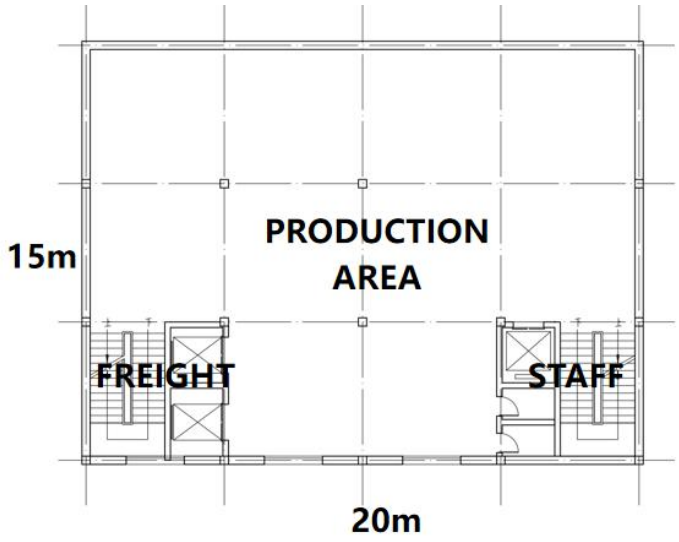


Fig 4-4 Current upgraded spatial model of production in Kanglu Village (source: the author)

However, under the constraint of controlling the floor area of individual buildings, excessive shared area in factories results in high operational and maintenance costs per production area. Although two units can be combined spatially, as shown in Fig 4-5, additional corridors are required to meet employee and cargo flow needs between the two units, resulting in overly homogeneous functions within the production unit.

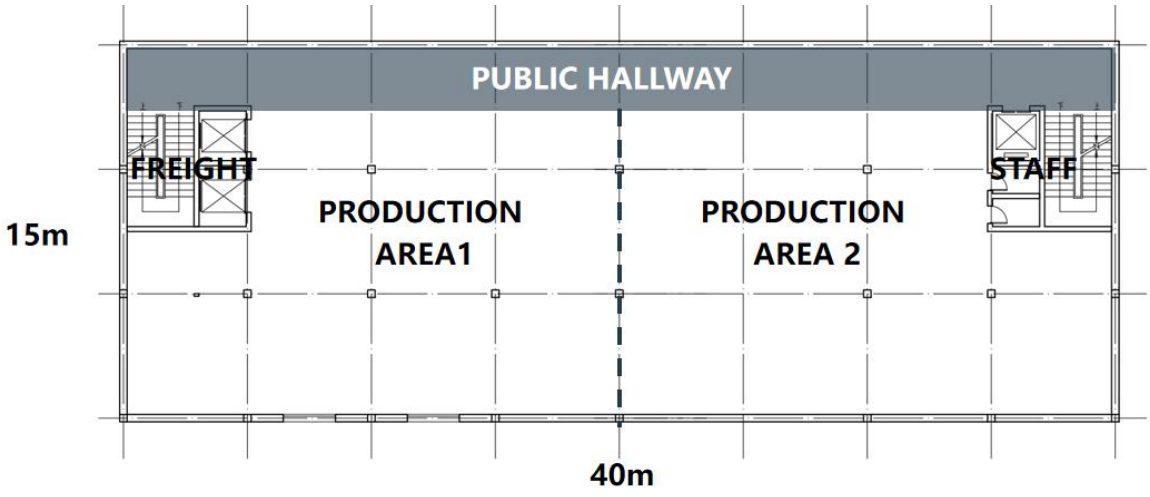


Fig 4-5 Combination of two production units (source: the author)

To address this, a half-unit(or 1/2 production unit) design of 10m*15m is introduced. This unit connects at least one or more production units, sharing vertical circulation while complying with fire evacuation requirements, thus reducing the shared area. The combination

methods are mainly divided into direct connection and connection via corridors, ensuring that any point inside the building is within 40m of an evacuation stair to comply with fire safety regulations. Additionally, the space of approximately 70 square meters outside of transportation can accommodate various functions such as offices, prototyping, storage, and finishing, allowing for flexible combinations with complete units to form diverse rental models and functional combinations that can be easily subdivided, rented, or sold. As illustrated in Fig 4-6, an entire floor can be leased to an independent company, including two production units and one office unit, or one production unit can be replaced with a residential unit. Alternatively, three units can be leased to different companies, sharing the employee entrance of the 1/2 production unit while maintaining independent cargo entrances within their respective production units.

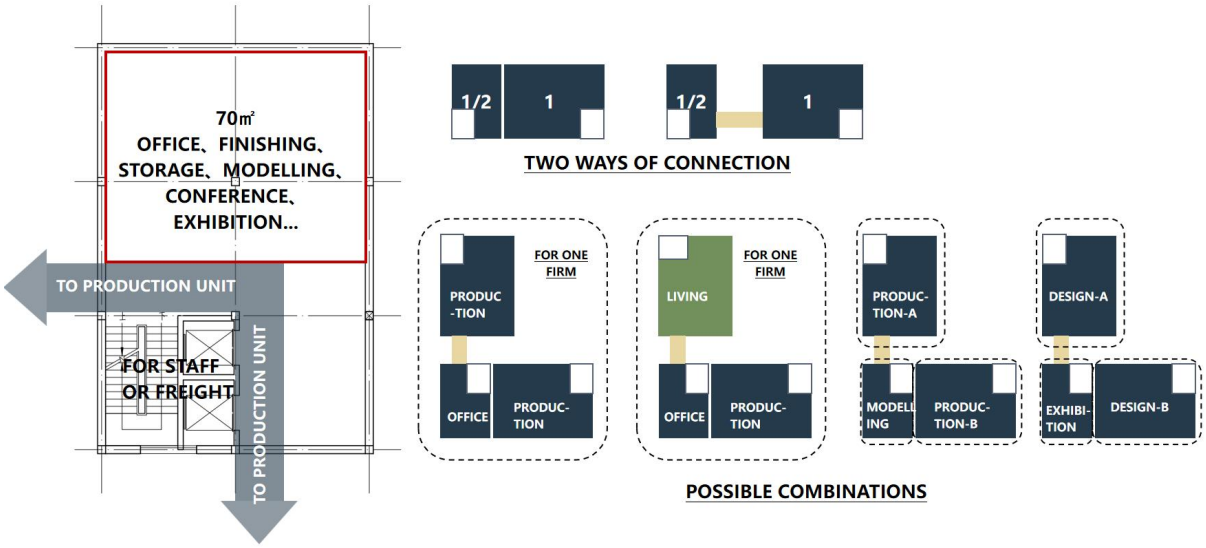


Fig 4-6 Introducing the 1/2 production unit and its possible spatial combination and rental methods. (source: the author)

4.2.2 Mixing at Block Scale

The design of mixing at block scale draws on relevant cases of open block mentioned before, selecting 50m, 80m, and 100m as basic plot units, with a distinguishable perimeter block as the fundamental form. A 50m block is the minimum scale required to create an internal courtyard, while blocks exceeding 100m may lead to poor pedestrian experiences due to excessively long continuous facades. The 80m block serves as a transitional scale between the two. Different scales of blocks can be further differentiated based on whether they

primarily focus on production, residential functions, or a balance of both. Each scale can accommodate various levels of service facilities.

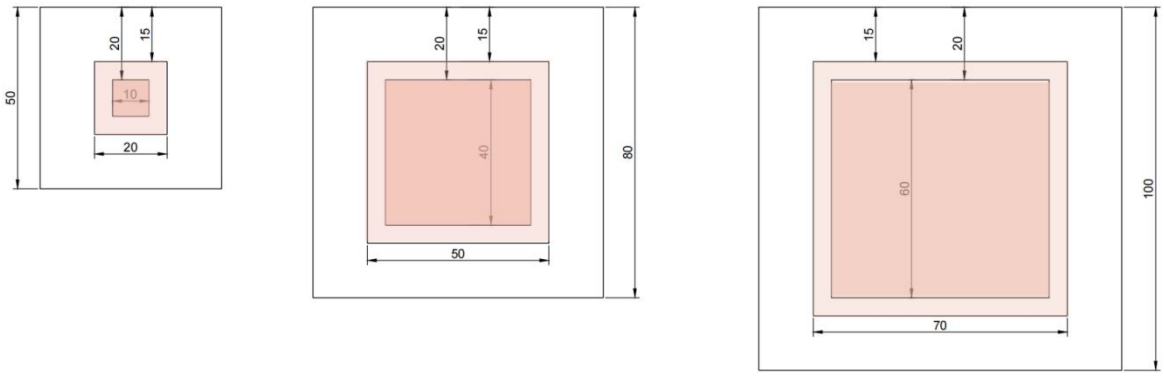


Fig 4-7 Three basic scale of open block and the dimension of their inner courtyards (source: the author)

Based on the analysis of basic functional units, after occupying the perimeter block with buildings that are 15m or 20m wide, the central areas of the three different scaled blocks can host various functions. The center of the 50m block leaves a courtyard width of only 10-20m, which can be partially used for parking or small landscaped courtyards. The 80m block's center can feature a courtyard width of 40-50m, suitable for medium-sized parking, public activity spaces, central landscape greenery, and lower-level public service facilities, or for small residential and factory setups. The center of the 100m block can reach widths of 60-70m, allowing for large parking lots, gathering squares, higher-level public service facilities, or even the inclusion of a 50m block.

In terms of spatial traffic layout, the circulation design for mixed production and residential function blocks follows the overarching principle of separating internal and external flows. This means that residential and employee entrances are distinct from logistics entrances. A 4m-wide fire lane should be retained along the edge of the internal courtyard, and each block should have at least two shared entrances, with dimensions exceeding 4m in height and width. Based on this internal-external distinction, there are three basic forms of perimeter blocks.

The first is internal pedestrian friendly type, where logistics entrances are located on secondary streets with fewer shops and lower pedestrian activity density, allowing both residential and employee entrances to be situated within the courtyard. The courtyard would

only retain a 4m fire lane, with vehicles generally prohibited, and a community garden could be designed at the center.

The second is external pedestrian friendly type, primarily suited for perimeter blocks surrounded by main roads. To maintain an uninterrupted pedestrian experience and vibrant interface along the main road, the primary logistics entrance should be placed within the block, while employee and residential entrances are positioned along the main road. Consequently, the internal courtyard can be designated for parking or as a storage area for goods.

The final type is a hybrid of the two, which may also be the most common form in actual designs. For this form, public space functions within the courtyard and internal circulation spaces should be thoughtfully designed to minimize the impact of daily logistics on pedestrians.

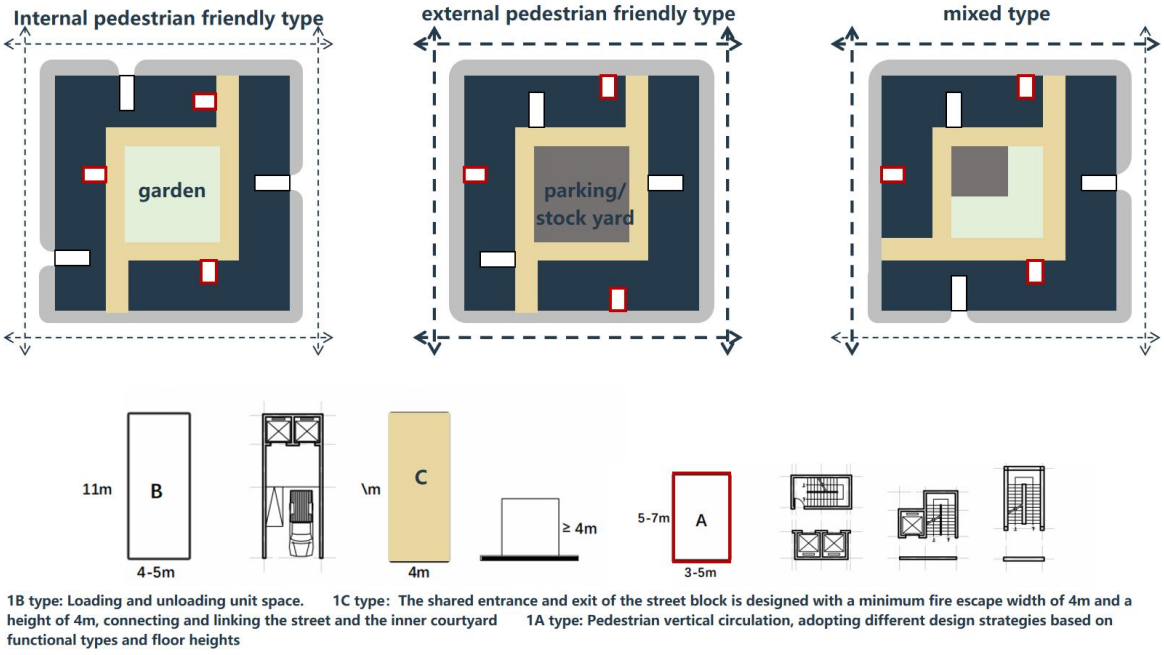


Fig 4-8 Three ways to distinguish logistics and pedestrian flow lines within perimeter blocks (source: the author)

4.2.3 Mixing at Architecture Scale

Mixing at architecture scale can be further categorized into vertical mixing and horizontal mixing. Vertical mixing follows the principle of transitioning from public to private spaces and the balance between production and living functions. This can be divided into two

types. The first type satisfies the balance within a single building, with the ground floor designated for studios or factories, middle floors for dormitories or apartments, and the top floor for owner-occupied residences. The ratio of studio, dormitory, and residential floors can be 2:2:1 or 1:1:1. This mixed-use model references the Fillome mixed-use building in South Korea, located in a densely populated industrial zone, where the ground floor accommodates parking and commercial spaces, the middle floors are for studios and rental apartments to meet tenants' production and living needs, and the top floor is for owner occupation.

The second type of vertical mixing model only partially satisfies the balance, excluding owner-occupied spaces. The ground floor can serve as shared living and working areas. The ratio of studios to dormitories or apartments can range from 1:1 to 1:3, allowing for external rentals to accommodate outside living demands and foster interaction among different groups. This mixed-use model draws inspiration from the open apartment Kitasenzoku in Japan, where the goal was to create a living circle near Tokyo Institute of Technology for the university, nearby companies, and local towns.figure)

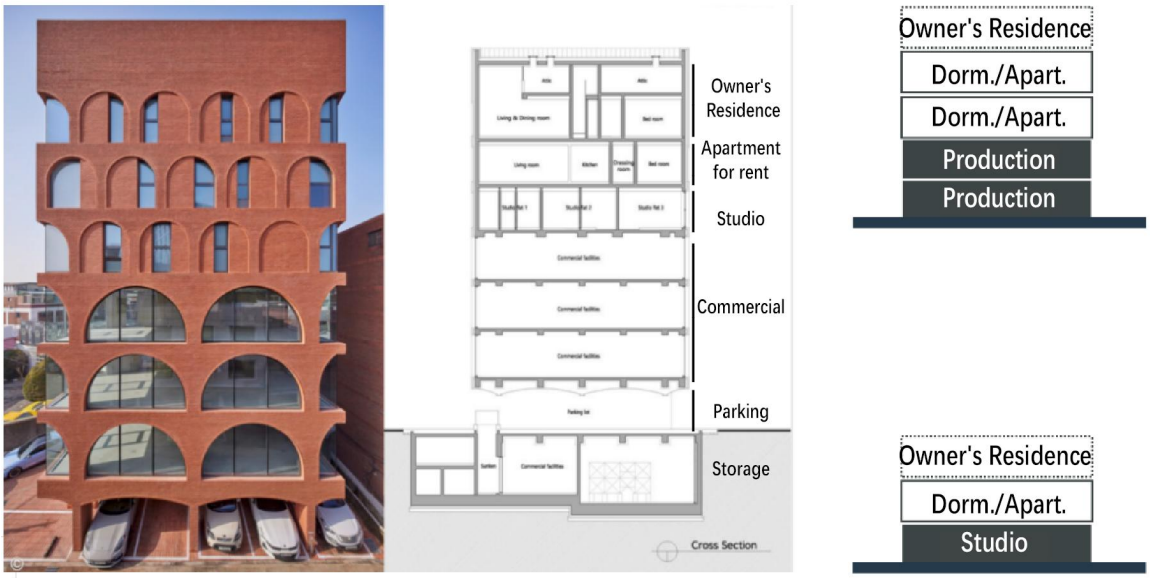


Fig 4-9 The Fillome mixed-use building in South Korea（source：archdaily）

Fig 4-10 The apartment Kitasenzoku in Japan（source：archdaily）

Horizontal mixing separates living and production functions, linked by traffic spaces or courtyards. This model can relate to the road in two ways: one where both production and living faces are oriented towards the road, leading to separate entrances for studios and apartments, potentially with two distinct addresses. The other scenario features either production or living facing the road, with shared entrances. An example of this is found in the Almere Poort community in the Netherlands, where living and working are located in two separate buildings, each with independent entrances connected by circulation spaces.

Fig 4-11 Housing type in Almere Poort community in the Netherlands（source：archdaily）

4.3 Implementation Design

4.3.1 Site Selection and Analysis

The design for this project is located on a currently demolished site at the intersection of two main roads within the village, belonging to the collective properties of Kangle San and

Wu Societies. The area previously housed many dense garment factories, all of which have now been cleared, providing ample space for reconstruction.

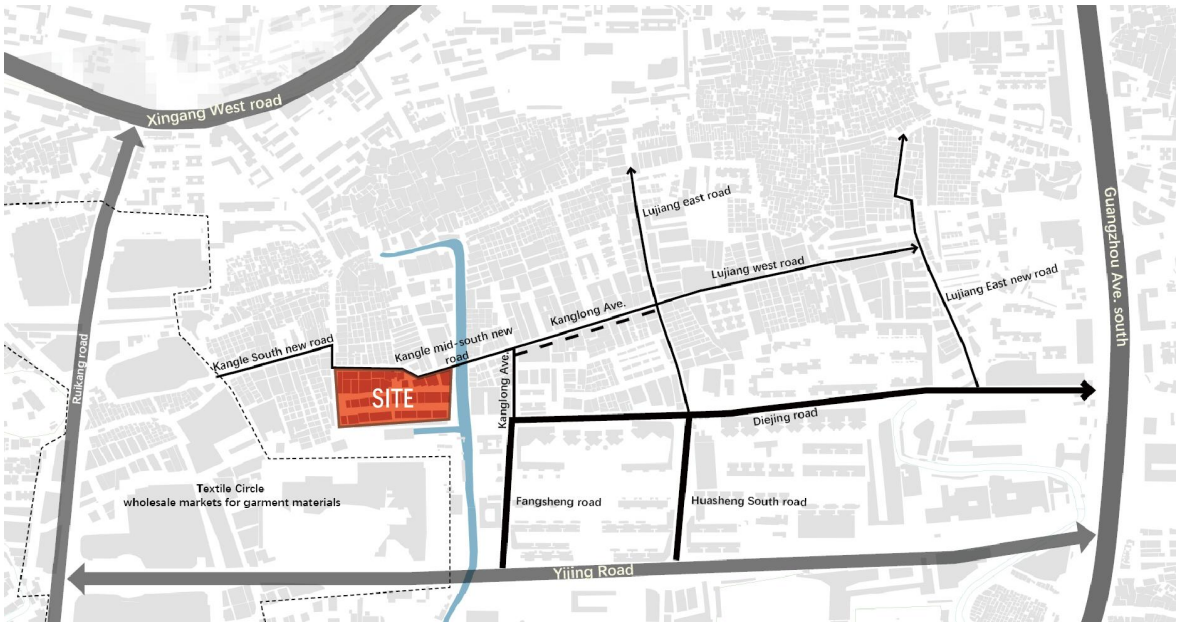


Fig 4-12 Location of the design site in Kanglu Village (source: the author)

Fig 4-13 Aerial view of the site（source：Baidu map）

Fig 4-14 Street view showing the garment production factory inside the design area before demolishment （source：Baidu map）

The northwest side of the site is bordered by a two-way road, with widths ranging from 9 to 13 meters. The north-south main road connects to the Pearl River International Textile City to the south and leads directly to Xingang West Road to the north. The east-west road connects the international fabric markets on both sides of Ruikang Road and the main garment production axis in the village, making the northwest side particularly busy.

The southeast side of the site adjoins a river, a water purification plant, and the back walls of a fast logistics center. This layout demonstrates a clear division between active and quiet zones from southeast to northwest. Such a spatial configuration and environmental characteristics provide clear direction for the design, allowing for functional zoning, architectural layout, and landscape design to fully utilize this dynamic and static zoning, creating an urban segment that meets vibrant needs while preserving tranquil spaces.

Fig 4-15 Analysis of the interface around the site (source: the author)

4.3.2 Generation of Design — Site Division and Production-Living Mixing

The design evolves and generates based on the existing urban road framework. Drawing on the previously discussed prototype design with 50m-80m block units, the involved area is initially divided into the street blocks shown in the Fig 4-15, distinguishing between mixed-use blocks and building-mixing zones. To address land-use economics and the shaping of public spaces, further merging of the blocks is considered, while also distinguishing between primary and secondary roads. The merging increases land utilization rates while ensuring that the widths of continuous street blocks remain below 80m, thus preserving the experience of small street blocks.

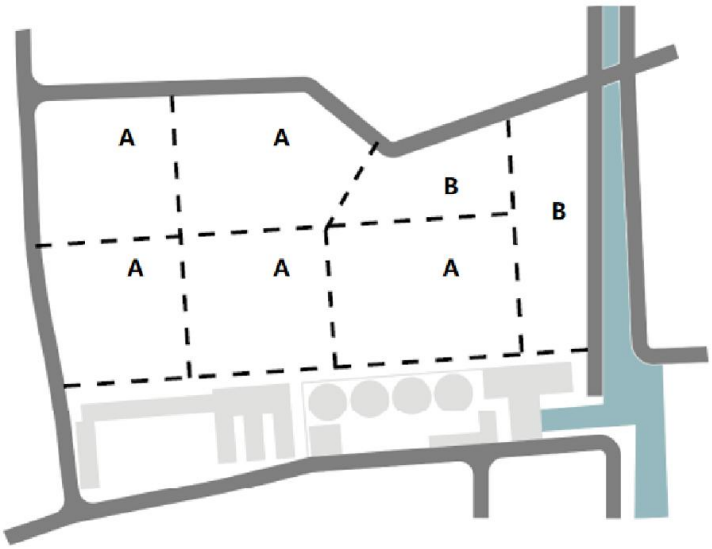


Fig 4-16 Initial division of street blocks and assigning different mixing methods (source: the author)

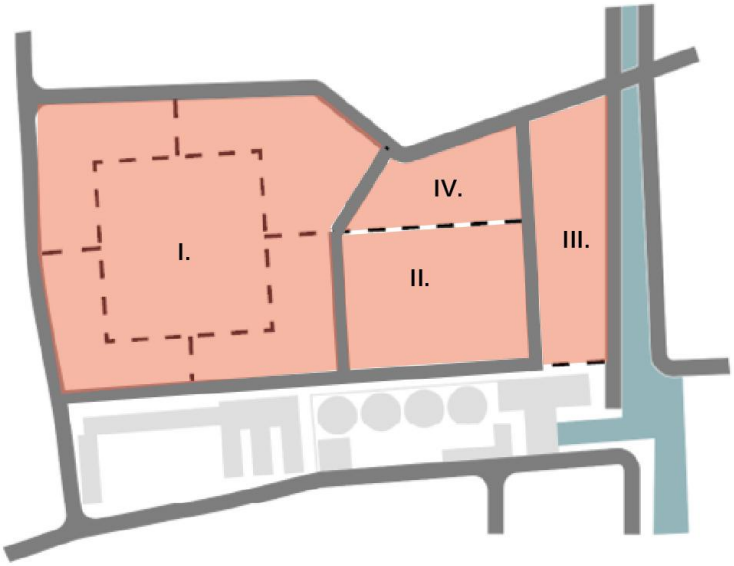


Fig 4-17 Merging of blocks (source: the author)

The merged blocks can be viewed as an 80m block nested within a central 100m block, yet in practical development terms, they are still comprised of four approximately 50-80m street block units assembled together, creating a concentrated community public center at the heart.

The overall layout of the design blocks is illustrated in Fig 4-18, which can be divided

into four areas: mixing at architecture scale (site 1), mixing at architecture scale (site 2), mixing at block scale (site 1) and mixing at block scale (site 2). The production functions include garment factories and 1/2 production units, while the residential areas comprise collective dormitories, rental apartments, and private residences. Additionally, there are two forms of mixed residential and production buildings, corresponding to mixing at architecture scale site 1 and 2. The ground floor is designed to create a vibrant street interface, featuring commercial and public service facilities. Furthermore, the ground floor of mixing at block scale (site 2) includes warehouse and parking functions.

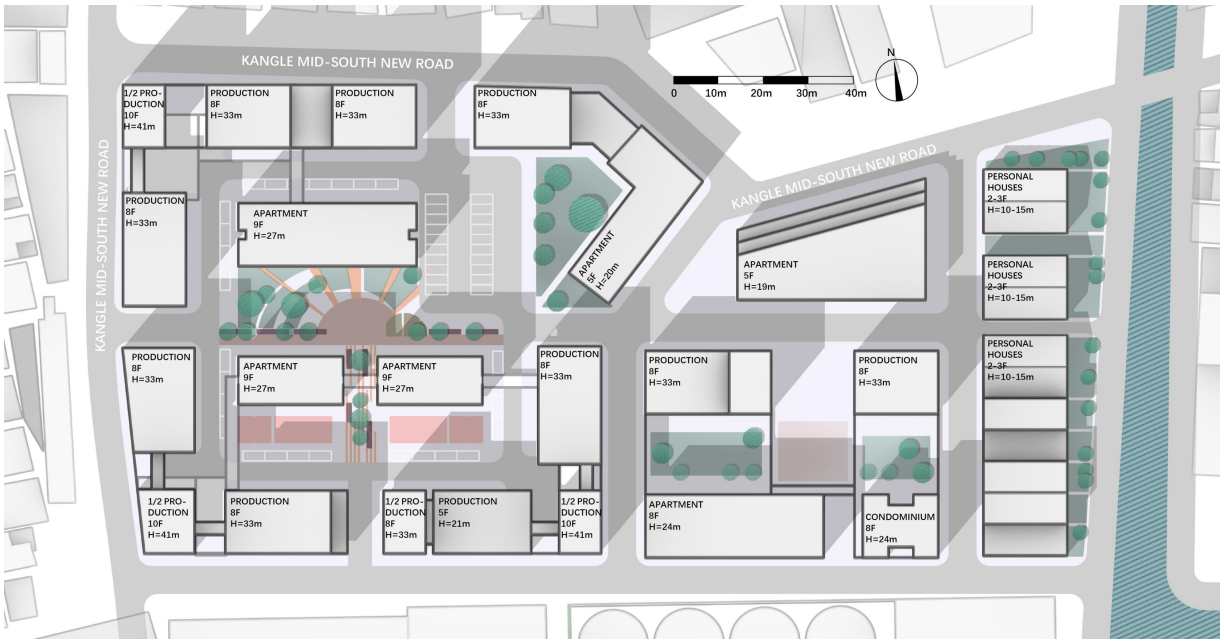


Fig 4-18 General plan and major technical-economic indices of the design area (source: the author)

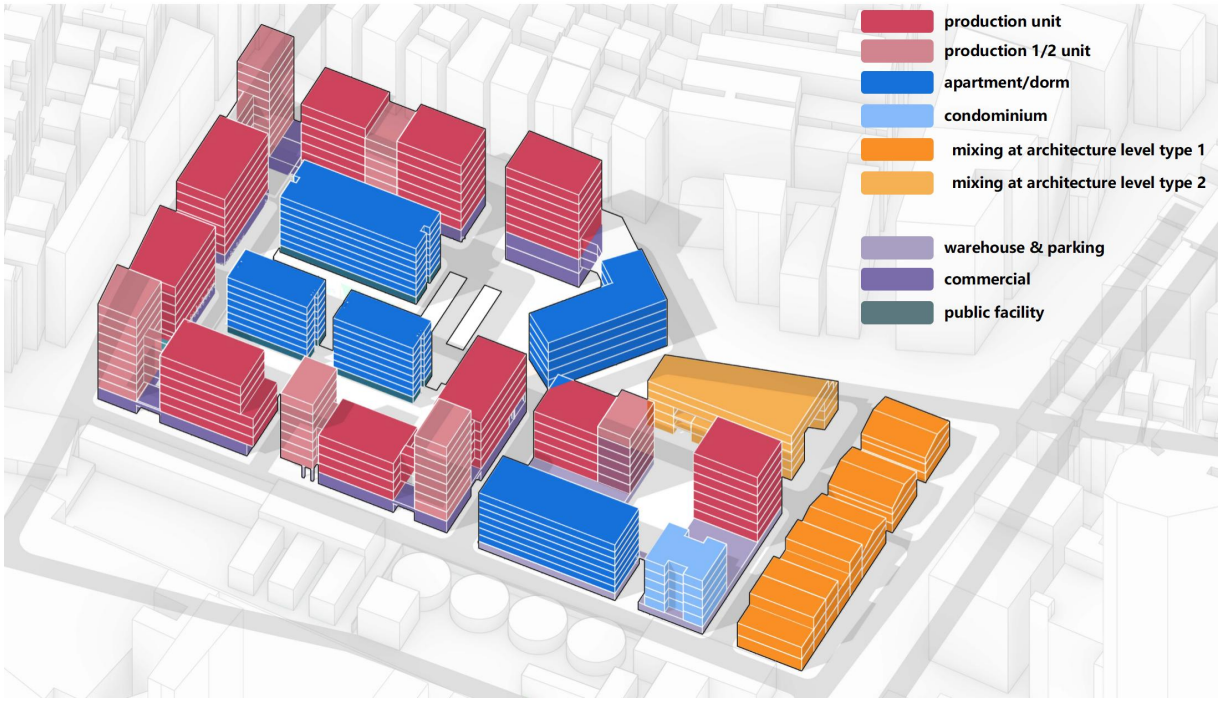


Fig 4-19 Analysis of functions of the design area (source: the author)

The axial function schematic is illustrated in Fig 4-18. This design will focus on discussing the spatial patterns and combinations that satisfy the balance of production and living within the minimum block size in mixed-use areas. In the mixing at architecture scale zones, the discussion will revolve around different spatial combination patterns within a single building and the relationship of combined buildings to the public road.

As mentioned in the earlier design principles, mixed-use blocks do not imply a complete integration of production and living; rather, it is essential to address the issues of local functions and circulation. In this design, the exploration of production-living mixing will be approached from three basic spatial hierarchical structures: the distinction between the interior and exterior of perimeter blocks, the front and rear distinctions of linear blocks, and the vertical distinctions between upper and lower spaces. This paper will conduct a detailed analysis of the four areas.

4.3.3 Specific Urban Design

(1) Mixing at block scale (site 1): distinct the interior and exterior of perimeter block

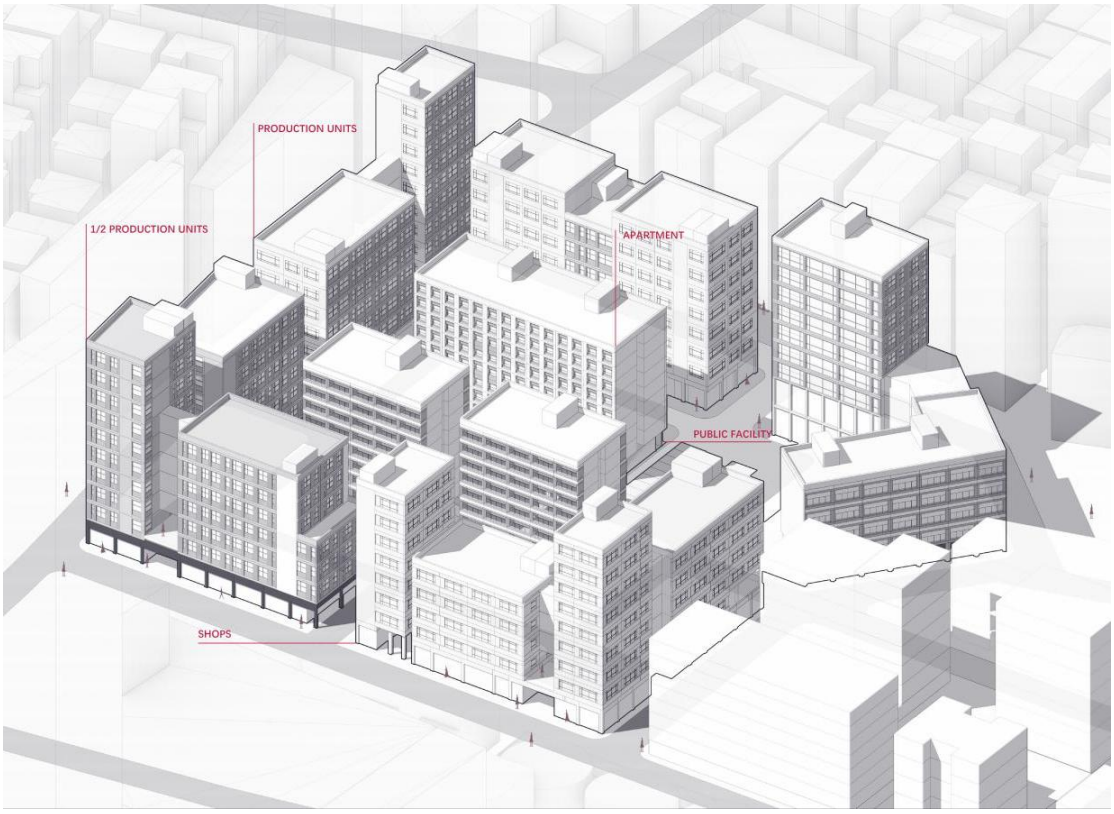


Fig 4-20 Axial view of mixing at block scale (site 1) (source: the author)

Fig 4-21 General plan of mixing at block scale (site 1) (source: the author)

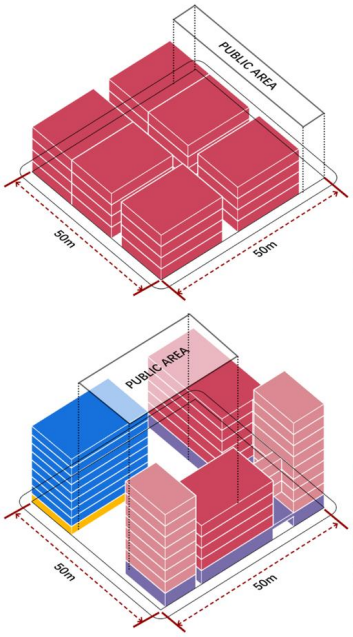
The axial and plan diagrams for mixing at block scale (site 1) are shown in Fig 4-19 and Fig 4-20. This block aims to design a minimum block form that achieves a balance between production and living, as well as the potential for these elements to combine into a unified community within the urban fragment. The design allows for zoning and role differentiation while constructing a complete community space. A dynamic balance of small-batch quick return production and residential modes is achieved within this block.

Analyzing the functions of the basic 50m x 50m block unit within Area 1, this scale allows for a balance between production and living, while providing a richer variety of business types and public spaces. The original 50m x 50m area can accommodate approximately 24 garment production units of 20m x 15m (the minimum size for small-batch orders), equating to about 7,200 ㎡ of production space, capable of housing 240-480 workers. Previously, garment factories were relatively low, typically 3-4 stories high, with narrow separations of about 5-8m between them. There was no public space for daily residents or workers' activities. The main road could accommodate temporary resting and business discussions for workers, but this often caused traffic congestion and resulted in low-quality public spaces with safety hazards.

After the design, the 50m x 50m block can accommodate approximately 19 garment units, including 11 complete garment units and 16 flexible 1/2 units for other functions, totaling 5,700 ㎡ of production space. Additionally, it can house 1,065 ㎡ of commercial space, 375 ㎡ of public facilities, and 3,000 ㎡ of residential area. It is expected to provide 165-330 jobs, with corresponding accommodation for approximately 264 beds. The layout after design places garment production and accommodation around a central public area, meeting the spacing requirements between residential and production buildings.

The number of garment units in the mixed-use block after design is 80% of the original street block. The block can fully meet the residential needs of workers during the off-peak season and approximately 80% of the workers' housing needs during peak season. Furthermore, the block now features a richer variety of business types and more flexible rental and sales options, with a more complete set of commercial and public facilities, as well

as a more comprehensive public space. A comparative analysis before and after the design is illustrated in Fig 4-21.



Original 50m*50m garment production block
production

Designed 50m*50m mixing block
production
production 1/2 unit
apartment/dorm
commercial
public facility

	Original 50m*50m garment production block	Designed 50m*50m mixing block
number of production unit (20m*15m per unit)	24	19
Building area	7200㎡ production	5700㎡ production
		1065㎡ commercial
		375㎡ public facility
		3000㎡ residence
Number of workers	240-480	165-330
Accommodation available	/	264位

Fig 4-22 Comparative analysis before and after the design (source: the author)

Once the basic design for the balanced production-living block is completed, it is combined with embedded residential functions to form an initial inner and outer layered relationship. Finally, the central residential area is further merged, creating a spatial form with residential areas on the inside and production on the outside, as illustrated in Fig 4-22.

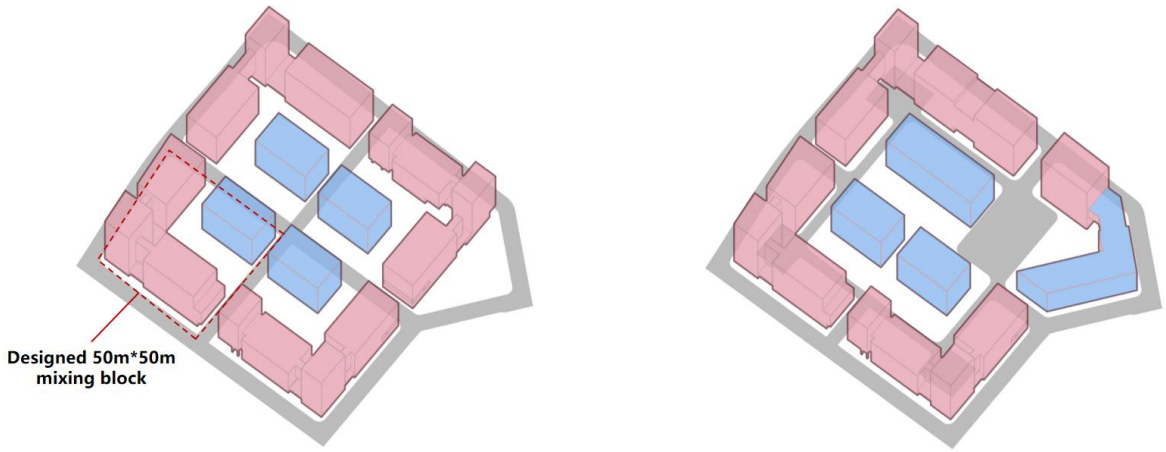


Fig 4-23 Design generation of mixing at block scale (site 1) (source: the author)

An analysis of the horizontal flow of living and production within the site is conducted. The street-level loading and unloading area is shown in Fig 4-24. The logistics direction is

concentrated in the inner circle, with loading areas and temporary parking set in the corners of the street block, connected to the unloading zones and freight elevators, ensuring smooth and efficient logistics. Employee entrances are concentrated in the outer circle, differentiating them from the inner logistics and back area. To accommodate commuting needs from the internal residential area to the external production area, corridors are set up on the second floor in certain areas, allowing direct access over the internal logistics flow to the production area.

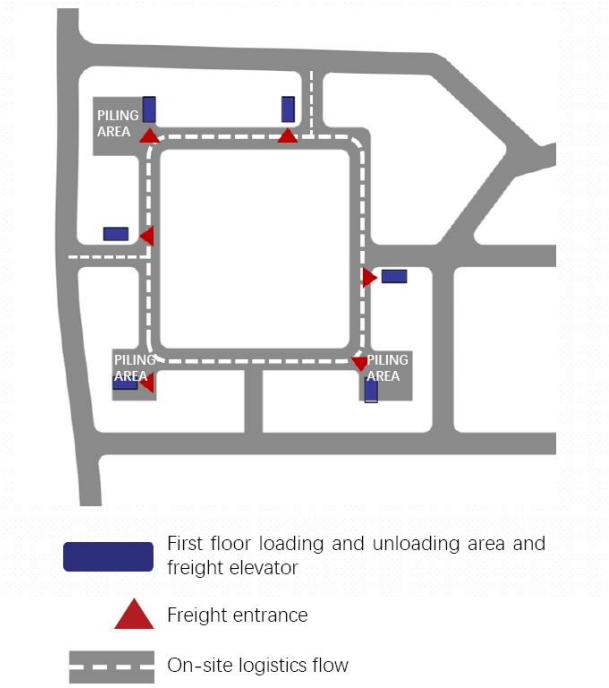


Fig 4-24 First floor logistics flow line and loading and unloading area (source: the author)

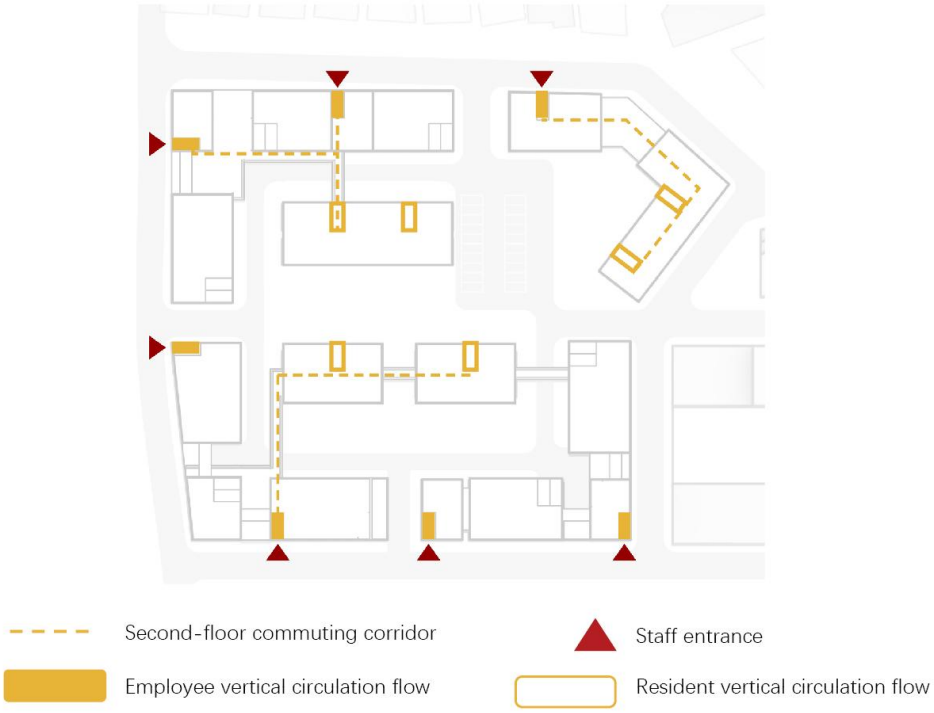


Fig 4-25 Employee vertical circulation flow and second-floor corridor (source: the author)

The sectional view in Fig 4-26 illustrates the local flow relationships more clearly. Workers living in the inner circle only need to reach the second floor and can walk directly through the corridor to the external production area. They can then take the vertical stairs directly up to the workshop or go down to the main street and access the respective production workshops. The overall layered relationship is illustrated in Fig 4-27: at the center is a community garden accommodating functions such as community planting, sports activities, and daily social interactions. The next inner circle consists of logistics, loading areas, and the back areas of stores. The outer circle features a vibrant main street focused on shops and employee entrances, promoting an active and open environment.

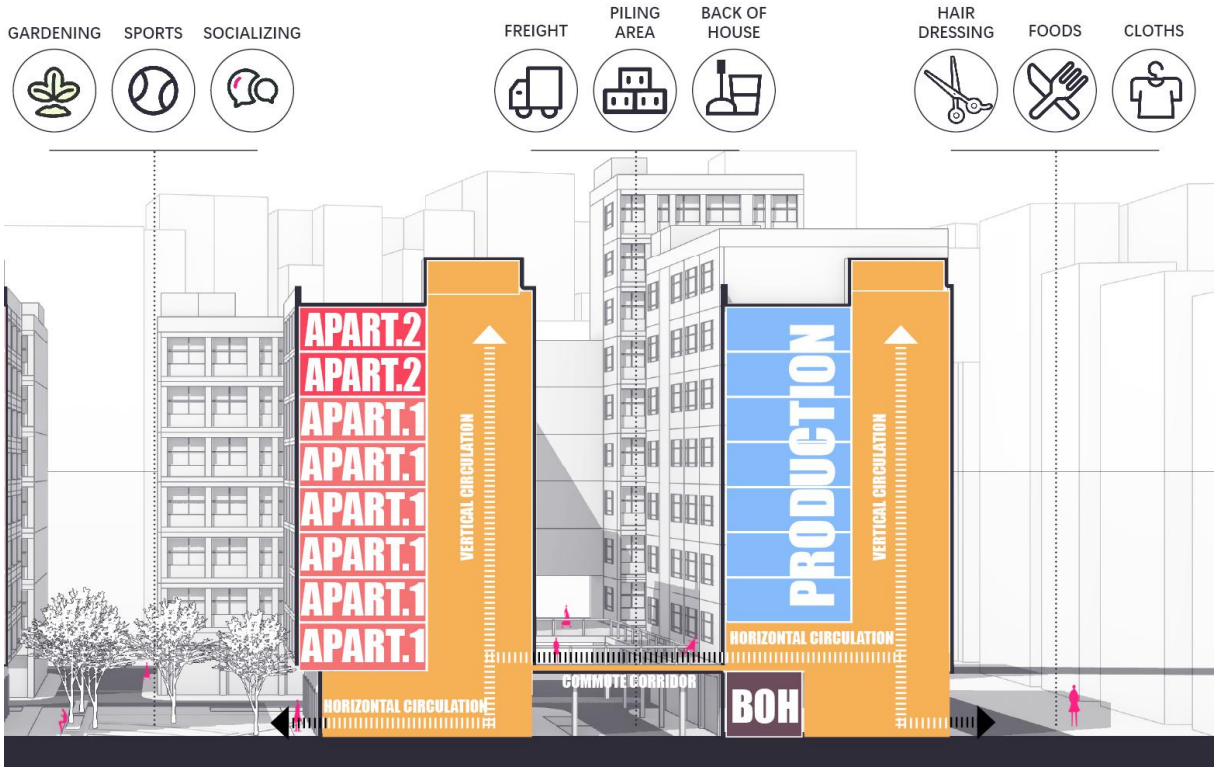


Fig 4-26 Employee commuting flow (source: the author)

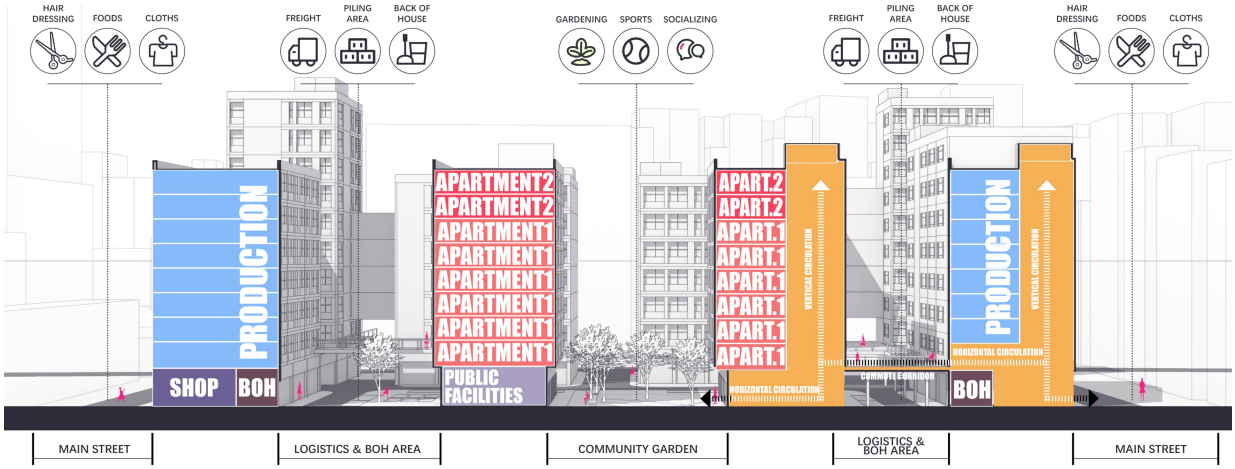


Fig 4-27 Section showing the distinction between the interior and exterior of designed block (source: the author)

An analysis of the functions and leasing methods within the production building is presented, as shown in Fig 4-28. This building consists of two complete production unit blocks and one 1/2 production unit block, featuring three basic leasing methods: leasing of production units individually, leasing of 1/2 production units individually, and leasing of entire floors or blocks. These three leasing methods can give rise to various functional types.

The 1/2 production unit can be used for design, exhibition, sampling, and storage, while the individual production unit is suited for small-batch quick-return garment production. Whole-floor leasing is appropriate for slightly larger garment companies, where the 1/2 production unit can be used for receptions, meetings, finishing processes, and storage, thus not occupying the complete garment production space.

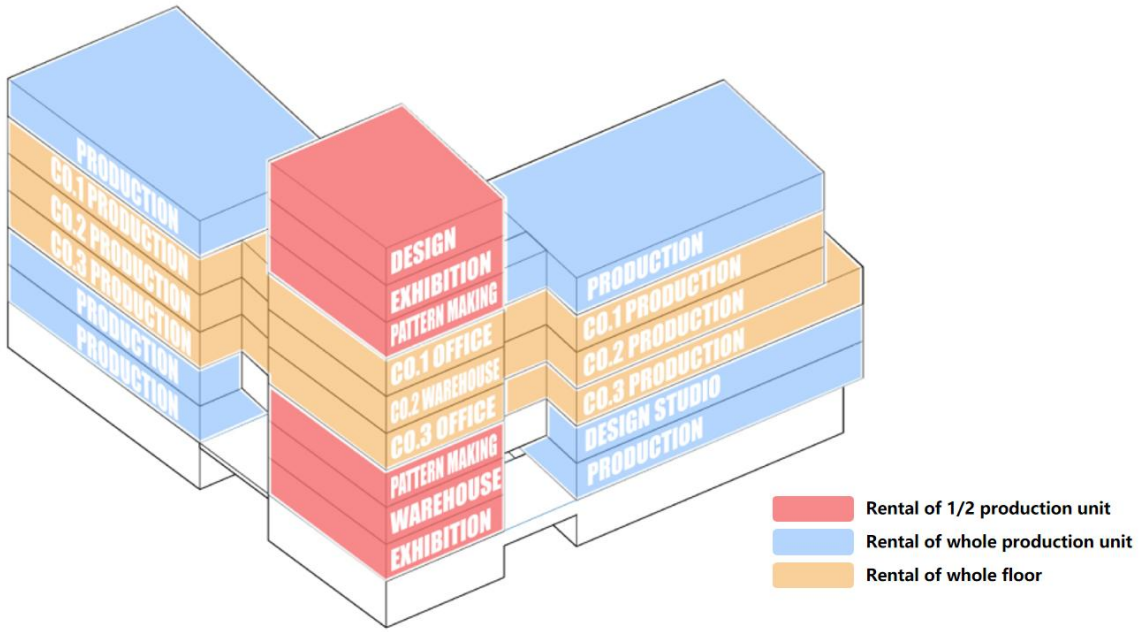


Fig 4-28 Analysis of the functions and leasing methods within the production building (source: the author)

An analysis of the residential building is provided in Fig 4-29. The apartment building contains three basic living models: dormitories for single employees, primarily featuring four-person shared dormitories. Two-person dormitories cater to the accommodation needs of "couple" employees common in the garment village, while regular residential units can accommodate families of 3-5 members. The residential units are located on the 8th and 9th floors, accessible by elevator, while the four-person and two-person dormitories are situated on the 2nd to 7th floors and can only be accessed by stairs. The ratios of these three living models are based on the number of workers in the balanced production-living block. Additionally, the four-person dormitories can be converted into two-person dormitories during the off-peak season to meet the varying housing needs of workers during peak and off-peak times, as well as the needs of a small number of long-term residents.

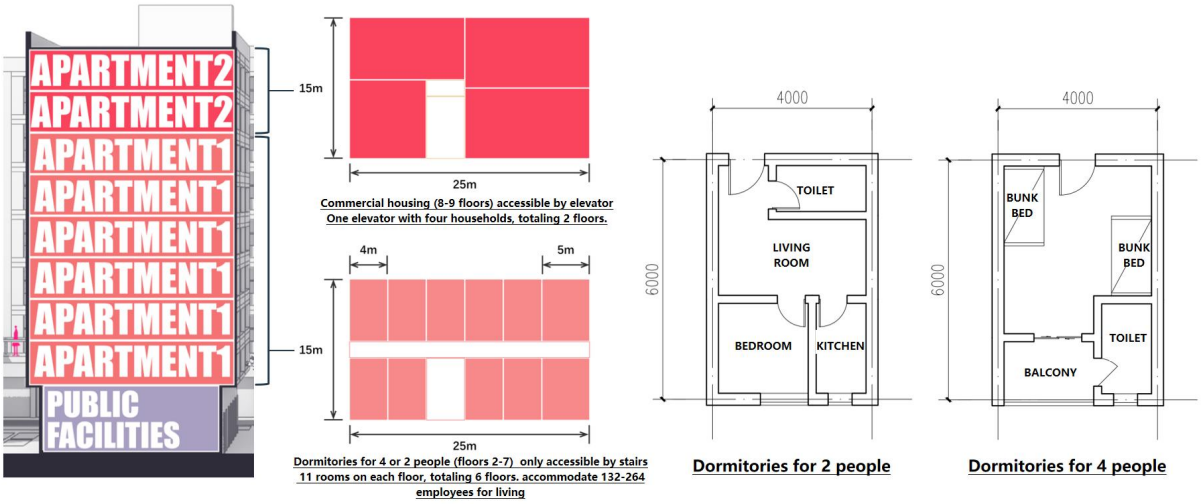


Fig 4-29 Analysis of the residential building (source: the author)

In summary, the design of Mixed-Use Block 1 responds to the mixed-use and openness principles mentioned at the beginning of Chapter 4. During the production off-season, the site provides ample residential space, while during peak season, it offers a relatively sufficient amount of housing. The entrances and flow for production and living are differentiated between the inner and outer circles. By maintaining reasonable distances, both production and living spaces can benefit from natural ventilation and daylight. The production space is designed based on the size of small-batch quick-return orders, allowing for various leasing or sale formats, and accommodating multiple upstream and downstream operations of the garment industry. Furthermore, the site offers various living arrangements, including worker dormitories, to meet the diverse housing needs of different populations, creating a core public space for the community along with surrounding public service facilities, encouraging integration among different groups and fostering a diverse and human-centered community.

(2) Mixing at architecture scale (site 1): distinct the front and rear of linear block

The design of mixing at architecture scale (site 1) aims to explore architectural types that combine residential and production functions, as well as their configurations within community spaces. The design controls the setback of the front yard and the type of interface space to create a unified streetscape. The general plan is shown in Fig 4-30.

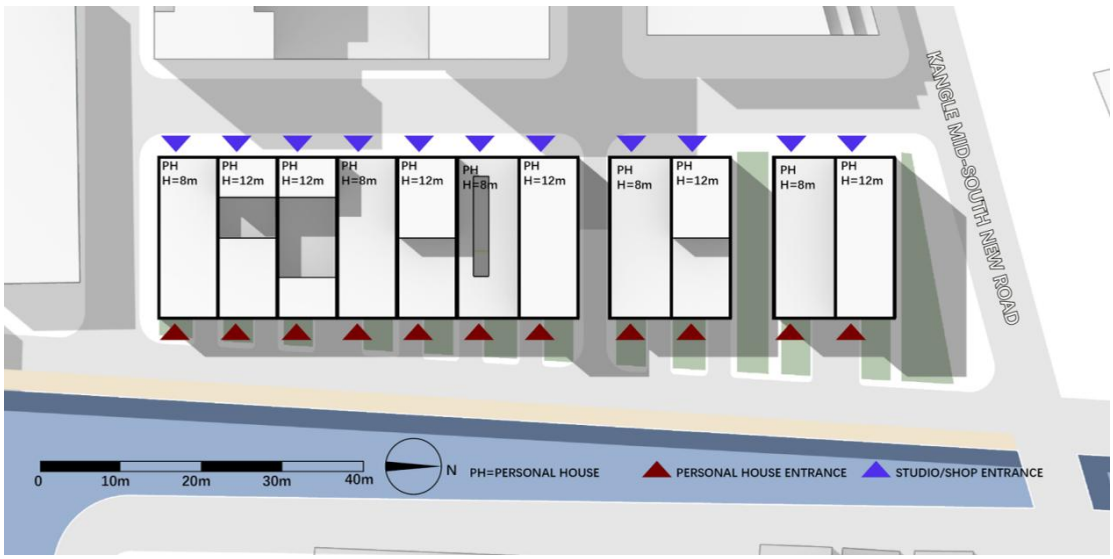


Fig 4-30 General plan of mixing at architecture scale (site 1) (source: the author)

The basic volume of the mixed-use building has a depth of approximately 20m and a width of 7.5m. The building is divided into front and back sections. The front side at ground level functions as a shop or studio, while the rear side serves as residential space, with no specific requirements for the second floor and above. The front and back sections are differentiated by two distinct addresses; the front entrance leads to shops and studios, while the back entrance leads to private residences. A courtyard garden is encouraged in the middle to address lighting issues in the central rooms. The individual buildings are designed by different architects, resulting in a diverse street interface, as depicted in the functional diagram in Fig 4-31 .

The building volumes are uniformly set back 3.5m from the road boundary on the shop and studio side to create a vibrant street interface. The residential entrance side is set back at least 3m from the road boundary.

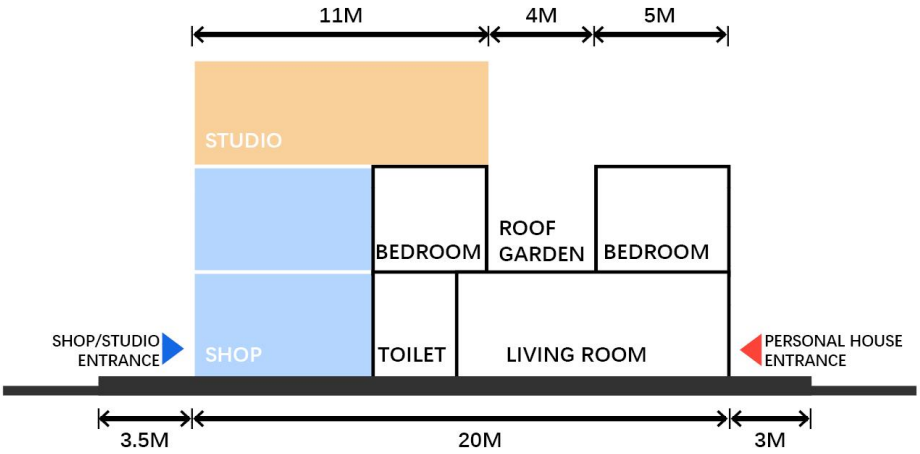


Fig 4-31 Functional and Dimensional Diagram of Single Building Section (source: the author)

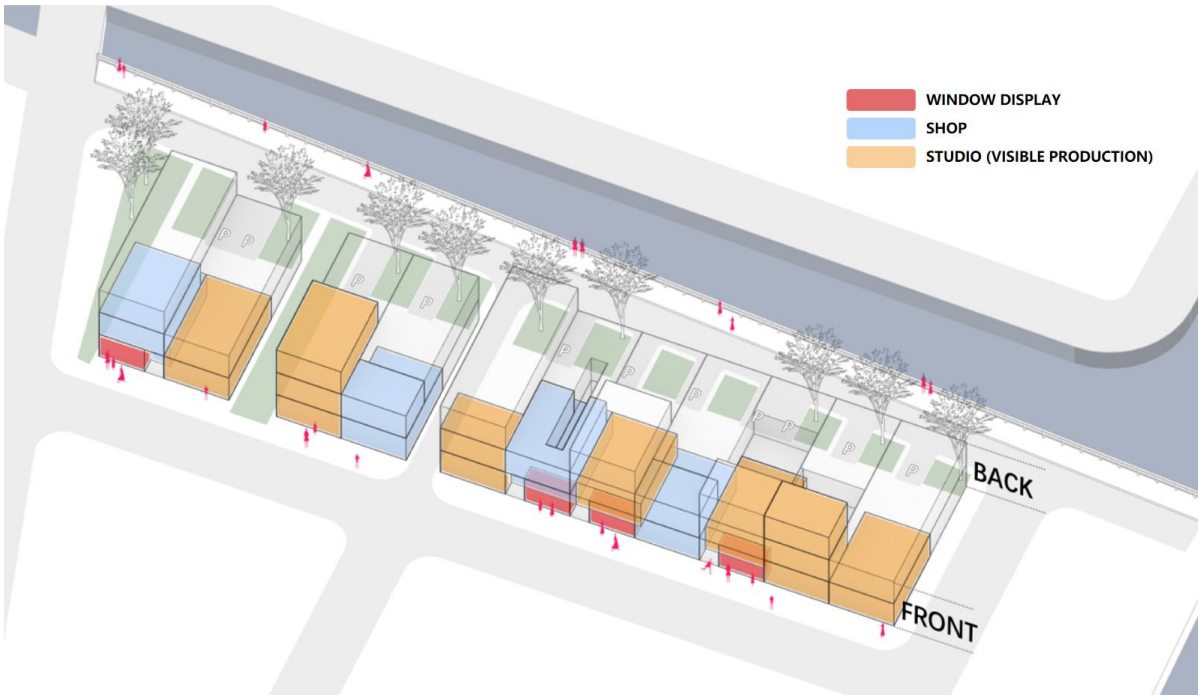


Fig 4-32 Axial diagram of mixing at architecture scale (site 1) (source: the author)

The aforementioned building units are tightly arranged within the block, forming a cohesive front and back interface. The front side faces the main road with higher foot traffic, creating various garment display landscapes, such as windows, shop fronts, and visible production areas. The back side faces a quieter, scenic secondary road and river, primarily featuring private gardens and parking. The axial diagram is shown in Fig 4-32.

(3) Mixing at block scale (site 2) & Mixing at architecture scale (site 2): distinct the front and rear of linear block

The designs for mixing at block scale (site 2) & mixing at architecture scale (site 2) aim to explore mixed-use spatial forms in the vertical direction. The sectional diagrams are illustrated in Fig 4-33. Building Mix Zone 2 consists of a single structure, with the first two floors including shared workspace, externally rented studio space, and a central atrium. The third floor and above are dedicated to externally rented apartments. The first floor of mixing at block scale (site 2) is designated for parking and storage, while the second-floor public space can be developed into a community garden, maintaining similar distances and relationships between residential and production buildings as in mixing at block scale (site 1).

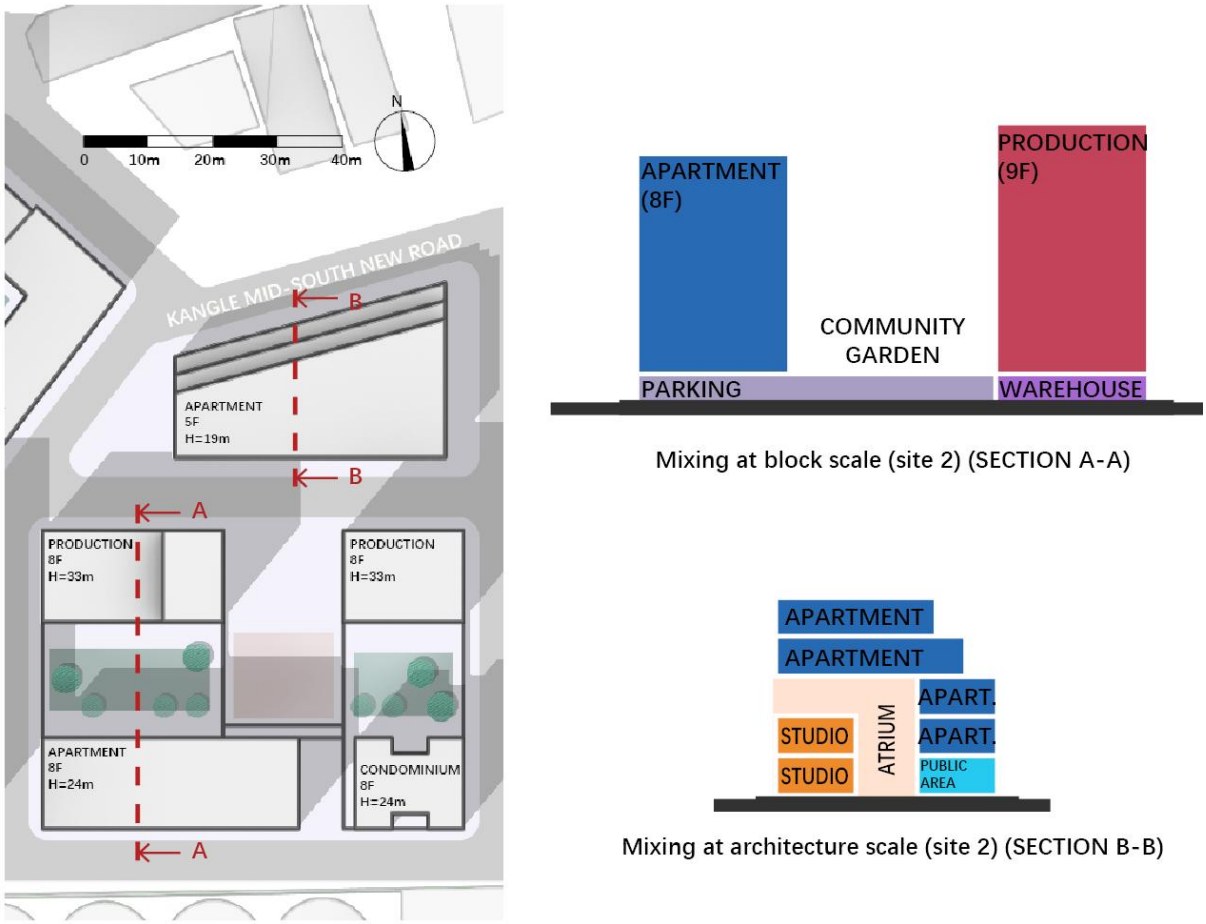


Fig 4-33 Plan and sections of mixing at block scale (site 2) & mixing at architecture scale (site 2) (source: the author)

4.4 Summary of the Chapter

This chapter’ s design practice synthesizes insights gained from the analysis of urban village industrial models and the issues outlined in Chapter 2 with the theoretical frameworks established in Chapter 3. From this integration, three fundamental design objectives and strategies emerge: ensuring economic viability within mixed-use models, striking a balance between production and reside

To address these objectives, the chapter proposes prototype designs specifically tailored for small-batch quick-return garment clusters. These prototypes focus on establishing mixed-use patterns that operate effectively at both the block and building levels. By drawing upon the comprehensive analysis presented in Chapter 2, the designs aim to create spaces that not only facilitate efficient garment production but also enhance the quality of life

In the latter part of the chapter, the discussion transitions to site-specific designs chosen along key locations, including the main road and riverbank in areas that have recently undergone demolition. These designs encompass two mixed-use block areas and two mixed-use building areas, strategically addressing the complexities of urban integration. The design considerations take into account the interplay of internal and external spaces, front and back relationships, and the vertical layering of activities.

By focusing on these layered relationships, the proposed designs aim to foster a cohesive environment where production and residential activities coexist harmoniously. The emphasis on mixed-use development not only seeks to enhance economic viability but also promotes a vibrant community atmosphere, enabling local businesses to thrive alongside residential spaces.

Conclusion

This paper begins with an analysis of the current industrial structure and spatial characteristics, gradually advancing to the application of design theories and methods, and finally implementing them in an actual design site. First, a comprehensive analysis of the site was conducted from aspects such as location, social composition, and historical background, clarifying the significance of Kanglu Village's existing "small batch quick return" industrial structure and township community social structure. This reflection on the limitations of the current planning scheme led to the research question of whether there could be a more optimized spatial structure for the "small-batch quick-return" industry. Based on this, a qualitative study of the entire garment industry was carried out, combined with field research to bind each step of the garment production chain to its corresponding spatial requirements, analyzing spatial needs, production-residence ratios, and other aspects to provide references for the subsequent conservation and upgrade designs.

To propose new development goals and design strategies for the "small batch quick return" mixed-use units, this paper carried out research in practice, referencing two theoretical aspects and studying their local application. First, using the neighborhood unit theory as a framework, an overall development framework was proposed. Second, through the practical methods of the open block theory, it explored how to use the block as the basic design unit to create better-quality "small-batch quick-return" living and production communities. Finally, in combination with design objectives and prototype design, specific sites were selected for practical application and on-the-ground practice.

(1) Innovation:

1. This study discusses the spatial organizational characteristics of post-Fordist production models at the block and building scale. It quantitatively explores the production scale and appropriate spatial dimensions resulting from networked and decentralized production, specifically focusing on the small-batch quick-return garment-making model as a typical post-Fordist production method. The research systematically investigates optimal

urban spatial structures that integrate production and residence under a production-led framework, considering logistics, production-residential ratios, and spatial organization. While different industries have varying production modes and spatial requirements, this study attempts to enrich the spatial research at this scale through practical examples.

2. The proposed solutions emphasize "high quality" and "low cost." High quality is reflected in controlled building heights and widths, basic block scales, and differentiated production-residential flows, which enhance urban walkability while providing good natural lighting and ventilation for both residences and factories. Low cost is characterized by minimal redevelopment actions, allowing for multiple stakeholders to participate in the development through flexible, phased construction, and enabling future functional and architectural changes, thereby reducing the investment risks and costs associated with large-scale developments.

(2) Reflection:

1. The existing research on small-batch quick-return garment-making spaces in urban villages can be further deepened. While site investigations provide a general understanding of the public and private garment spaces, there is still a lack of continuous spatial discussions and expressions from streets to buildings.

2. There is a lack of quantitative evaluation and control of design outcomes. The optimized design will significantly reduce the total area of garment factories, but further research is needed to determine the extent to which the benefits from improved block quality can compensate for the loss in production capacity.

Lastly, the author recognizes that the renewal of trade-oriented urban villages, particularly those centered around garment-making clusters, is a multifaceted issue that involves a diverse array of stakeholders. This complexity stems from the various interests, goals, and challenges faced by these groups, which include technicians who ensure the efficiency and quality of production processes, government officials who create policies and regulations, village collectives that represent local interests, developers seeking investment opportunities, factory owners focused on profitability, and workers whose livelihoods depend

on these industries.

To effectively address the challenges associated with the renewal of these urban villages, it is essential to foster collaboration among all involved parties. Such cooperation can help align objectives and facilitate the sharing of resources and knowledge, ultimately leading to more sustainable and equitable outcomes. While this study does not encompass every production mode within garment villages, the approaches proposed herein serve as valuable guides. They underscore the significance of preserving the organically evolved industrial ecology of urban villages, which has developed through years of community engagement and adaptation.

Moreover, the exploration of these approaches highlights their practical feasibility, offering critical insights for future research and practice in urban renewal. By emphasizing the importance of integrating local cultural and industrial characteristics into renewal efforts, the findings provide a foundation for creating urban spaces that are not only economically viable but also socially inclusive and environmentally sustainable. As such, this study contributes essential references for stakeholders looking to navigate the complexities of urban renewal in garment-making clusters, ultimately fostering a more harmonious relationship between urban development and the communities that inhabit these spaces.

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