

Research on Renovation Design Strategies of Old Residential Districts in Shijiazhuang Based on the Theory of Urban Micro-Renewal

-- A Case Study of Yaxinyuan North Community

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Abstract: This study takes the North District of Yaxinyuan in Shijiazhuang as a case study and explores the design strategies for the renovation of old residential areas based on the theory of urban micro-renewal. The research finds that old residential areas in Shijiazhuang generally face problems such as building aging, lack of public service facilities, and insufficient greening, while the North District of Yaxinyuan has particularly prominent contradictions in aspects like building safety, aging-friendly facilities, and the vitality of public spaces. Through questionnaire surveys and on-site investigations, the authors propose an "acupuncture-style" minimally invasive renovation strategy. This study constructs a renovation method system of "collaborative governance of multiple subjects—coupling of policies and community needs—dynamic program optimization", providing a "low-cost, low-intervention, and high-inclusiveness" renovation model for the transformation of old residential areas in northern industrial cities. It holds reference value for promoting the modernization of urban governance and the improvement of the quality of human settlements.

Keywords: Urban Micro-Renewal; Old Residential Areas; Shijiazhuang; Renovation Design.

1. Introduction

1.1. Research Background and Significance

As China's urbanization process has entered a stage of high-quality development, the urban construction model is undergoing a crucial transformation from incremental expansion to stock optimization. China has undergone unprecedented urbanisation over the last three decades with an annual increase rate of 2.86%. [1] At the beginning of the founding of the People's Republic of China, the urbanization rate was 10.64%, and by the end of 2022, it had risen to 65.22%, with the permanent population reaching 920.71 million, making it the largest-scale and fastest-paced urbanization phenomenon in history. At the same time, a large number of old residential areas built in the 1980s and 1990s are facing the dual predicament of physical space decay and social function disorder. The functional facilities and services of old communities have been unable to satisfy residents' growing demand for living quality, [2] and conflicts between residents and the community living environment, such as the lack of disaster-prevention facilities, aging-friendly facilities, and car parking spaces, have become more and more prominent, [3] which seriously restrict the improvement of the quality of human settlements and the sustainable development of cities.

At the policy level, the renovation of old residential areas has been incorporated into the important agenda of the modernization of the national governance system. Since the Central Urban Work Conference first proposed "promoting the comprehensive renovation of old residential districts in an orderly manner" in 2015, the State Council has successively issued a series of documents such as the Guiding Opinions on Comprehensively Promoting the Renovation of Old Urban

Residential Districts. According to the data on the renovation of old neighborhoods released by the Ministry of Housing and Urban-Rural Development of the People's Republic of China in 2020, thirty two provinces have already renovated old neighborhoods, and 70% of the renovation projects have been started.[4] In December 2024, the Central Economic Work Conference explicitly proposed "vigorously advancing urban renewal". As one of the key tasks to promote urban renewal, the renovation of old residential areas is not only of positive significance for ensuring and improving people's livelihoods and meeting people's yearning for a better life, but also an inherent requirement for building livable, resilient, and smart modern cities and composing the chapter of Chinese-style modernization in urban development.

From the perspective of social development, the renovation of old residential districts undertakes multiple missions of the times: First, as a practical carrier of the new-type urbanization strategy, it needs to respond to the people's livelihood demands and spatial justice issues under the concept of "people-centered city"; Second, driven by the "dual carbon" goals, the renovation project has become a key path for the green and low-carbon transformation of existing buildings; Third, through the renewal of the physical environment of communities, it triggers the innovation of grassroots governance mechanisms, providing an experimental field for the social governance pattern of joint construction, governance, and sharing. Many planners and scholars believe that top-down methods may no longer be applicable to handling complex community conflicts [5,6]. Collaborative governance focuses on coordinating and involving different public, private, and civil society stakeholders [7,8], emphasizing consensus building, collective decision making, and achieving common goals [9,10], and is, therefore, considered an effective model in community regeneration.

Especially against the background of the common prosperity policy, how to achieve the synergistic effect of "hardware improvement" and "software upgrading" in the renovation project has become an interdisciplinary research hotspot in the fields of urban planning, social governance, and public policy.

At present, such issues as the imperfect fund-raising mechanism, insufficient residents' participation, and ambiguous renovation standards have continuously restricted the effectiveness of renewal projects for old residential districts. Moreover, in academic circles, in-depth research is still required on core topics including the interest coordination mechanism, the logic of spatial reproduction, and the sustainable operation and maintenance mode during the renovation process. Based on this, the author argues that systematically exploring the multi-dimensional value realization paths of old residential district renovation is of great practical significance for promoting theoretical innovation and practical breakthroughs in urban renewal.

It is hoped that this study can facilitate the advancement of the scientific renovation process of old residential districts in Shijiazhuang. Specifically, it aims to propose hierarchical and classified design strategies addressing local typical issues, such as high energy consumption for winter heating, insufficient vitality of public spaces, and the demand for the revitalization of industrial heritage. These strategies are intended to help resolve the renovation pain points of over 3,500 existing old residential districts across the city, while also serving the Beijing-Tianjin-Hebei Coordinated Development Strategy. By summarizing the pilot experience of Shijiazhuang, this study is expected to provide a "low-cost, low-intervention, and high-inclusiveness" renewal paradigm for similar northern industrial cities, including Tangshan and Handan. This paradigm will contribute to the balanced improvement of regional urban quality and ultimately promote the modernization of urban governance. Furthermore, this study explores the collaborative mechanism of "community planners and residents' councils", which can help resolve frequent conflicts such as the installation of additional elevators and the renovation of parking spaces. In doing so, it provides an operable path for the implementation of the Implementation Plan for the Renovation Project of Urban Old Residential Districts in Hebei Province, while simultaneously promoting the enhancement of grassroots governance capacity and the accumulation of social capital.

2. Theoretical Analysis of Urban Micro-renewal

2.1. Core Connotations of Urban Micro-renewal Theory

In the 1970s, foreign countries gradually adopted small-scale and incremental urban renewal approaches. A representative example is the well-established "urban acupuncture", which realizes the renewal design of small and medium-sized urban spaces to fully tap the potential value of small spaces, stimulate vitality at a macro level, and ultimately achieve the goal of improving the overall urban environment. The theoretical research on China's "micro-renewal" originated with Mr. Wu Liangyong, who proposed the urban development theory of "organic renewal". This theory is elaborated in detail in his book *Old Beijing and Ju'er Hutong*. The concept of urban micro-renewal offers an alternative strategy. It emphasizes precise, small-scale

interventions tailored to local conditions, adopting a 'surgical' approach that targets critical spatial problems without major demolition or relocation. Compared to conventional large-scale projects, micro-renewal enables more sustainable, human-centered, and context-sensitive transformation. [11] This study interprets the guiding role of the urban micro-renewal theory in urban renovation from four aspects, namely the development-renewal model, reconstruction-transformation model, weaving-reinforcement model, and protection-renovation model.

2.1.1. The Development-Renewal Model

This model mainly takes declining urban areas characterized by poor living environments, inferior building quality and low living standards as the research objects. These areas are marked by severe population loss and aging, which leads to a continuous decline in the level of social integration. In view of the current situation that these areas lack public spaces and infrastructure, combined with the needs of urban development and the aspirations of residents, the Development-Renewal Model is quite suitable for such areas. The Development-Renewal Model can inject factors of sustainable development into declining areas, so as to meet the needs of urban development, the functional demands of residents and the requirements for living quality, thereby enabling the city to achieve renewal and sustainable development.

2.1.2. Reconstruction-Transformation Model

This renewal model is applicable to urban areas that have formed a stable spatial texture and scale pattern. Residents in such areas generally maintain the living habits formed in the early stage, with closely connected social networks and a high level of community integration. However, these areas are simultaneously confronted with practical predicaments such as the urgent need to optimize the quality of living environments, insufficient supply of public service functions, and increasingly prominent pressure of intensive land use. Therefore, in the process of renewal, the core goal should be to construct a systematic and sound urban spatial structure, so as to promote the continuous optimization and adaptation of various spatial elements based on practical functional demands and the development trend of the times.

In specific renewal practices, designers should thoroughly explore the historical context and characteristic elements contained in the areas, and realize the inheritance of cultural genes through systematic protection and inheritance. Meanwhile, for spatial elements that are disconnected from the needs of modern life and lack functional adaptability, targeted and small-scale micro-renewal adjustments should be carried out. Ultimately, this will achieve the renewal goals of clear and orderly urban spatial form, diversified and improved functional hierarchy, and distinct layers of visual landscape.

2.1.3. Weaving-Reinforcement Model

This renewal model is applicable to urban areas that have undergone early renovation interventions or been affected by the radiation effects of renewal in surrounding districts. In the early-stage old-city renovation process, these areas have initially yielded partial socioeconomic benefits in terms of land use patterns, spatial layout structures and economic development modes. However, the renovation process has also exerted an impact on the original community network structure, resulting in the differentiation of the social attributes of the areas. Bearing renovation imprints of varying

degrees, these districts have not only formed a relatively sound internal urban functional system, but also accumulated precious urban cultural resources and historical heritage.

In the practice of micro-renewal, designers should adhere to the core principle of "protection first, living inheritance". On the one hand, they should carry out targeted repair and optimization on physical spatial elements such as block facade forms and color systems, so as to realize the value regeneration and vitality revitalization of historical and cultural heritage in the contemporary context. On the other hand, aiming at the problems of insufficient functional adaptability and service supply gaps within the areas, they should adopt the strategy of "weaving-style renewal". By means of functional supplementation and network connection, this strategy can strengthen the overall spatial resilience of the areas, enable them to better adapt to the development needs of modern society, and further systematically improve the quality of urban spatial environment and residents' quality of life.

2.1.4. Protection-Regulation Model

The micro-renewal model with "protection and regulation" as its core orientation demonstrates the minimal disturbance characteristics to the urban system among the several renewal models discussed in this paper. The applicable targets of this model are mainly urban areas characterized by superior spatial environmental quality, complete supporting public service facilities, diversified and rich population structure, and sound social network system.

From the perspective of spatial morphology, various functional units in such areas not only maintain their own integrity and orderliness, but also form organic linkages through physical space and social relations. Moreover, the spatially representative elements in these areas, such as the color systems, texture patterns, and symbolic signs with distinctive regional identity, profoundly carry and highlight the specific regional sense of place and cultural genes. These are also the core contents that designers should prioritize protecting and focus on translating in the process of old-city renewal.

From the perspective of the essential laws governing urban development and evolution, urban renewal is a continuous and dynamic process that runs through the entire life cycle of a city. In response to the increasingly prominent demands for quality improvement and connotation deepening amid current urban development, designers can conduct targeted renovation practices under the guidance of the micro-renewal philosophy by accurately identifying the key spatial elements within urban districts. On the one hand, they should preserve and inherit the high-quality public service facilities that feature sound functional adaptability and efficient operation within the districts. On the other hand, they need to carry out systematic optimization and refinement on the facility modules afflicted with functional deficiencies or inefficient operation. Ultimately, this will realize the sustainable development of urban districts on the basis of protecting their existing values.

2.2. Principles for the Renovation of Old Residential Districts Under the Theory of Urban Micro-renewal

The renovation of old residential districts shall abide by the principles of people-oriented development, incremental renewal, cultural continuity, and green and low-carbon

development. Prior to the renovation, the government shall clarify the key priorities of the project through investigations, interviews and other means, encourage residents to participate in decision-making and implementation, and establish a consultation platform to ensure that the renovation plan is closely aligned with residents' daily needs. In the renovation process, large-scale demolition and reconstruction shall be avoided; instead, priority shall be given to the repair and reinforcement of existing building structures, and an acupuncture-style renovation approach shall be adopted. The potential of marginal spaces shall be tapped to build multi-functional venues such as pocket parks and rooftop farms, thereby improving space utilization efficiency. Meanwhile, attention shall be paid to preserving landmark buildings, street patterns and historical traces, so as to inherit local history and carry forward regional characteristics. The primary goal of renovation is to enhance the safety performance of old residential districts. Specifically, it is necessary to identify potential risks of dilapidated buildings inside the districts and improve their seismic and disaster prevention capacity; plan evacuation routes, set up mini fire stations, and disseminate disaster early warning information via mobile applications. In addition, the installation of intelligent lighting systems and garbage classification monitoring systems can help improve management efficiency. After the completion of renovation, continuous monitoring and tracking shall be carried out, a post-renovation evaluation mechanism shall be established to assess the renovation effects, and feedback on residents' satisfaction shall be collected systematically.

3. Current Situation and Problem Diagnosis of Old Residential Districts in Shijiazhuang

3.1. Analysis of the Overall Current Situation of Old Residential Districts in Shijiazhuang

Shijiazhuang has designated the residential districts built before 2000, featured by outdated infrastructure and lack of property management, as the key targets for renovation. These districts are mainly composed of work-unit dormitories and staff family quarters, most of which are characterized by high building density and insufficient public spaces available for residents' daily activities.

The government has conducted inspections on the residential districts included in the renovation list, revealing the prevalence of such problems as aging infrastructure, inadequate public facilities, potential safety hazards, and low property management coverage. In some districts, building exterior walls are peeling off, roofs are leaking, and elevators are lacking; in others, there is a shortage of parking spaces, absence of lighting facilities, and low greening rates; still in others, there exist problems including unauthorized wire connections and poor drainage systems.

To address these problems plaguing old residential districts, Shijiazhuang has carried out renovation projects on over 1,500 such districts since 2018, with a total investment exceeding 10 billion yuan. Targeted measures have been implemented for old residential districts with differentiated demands, including building reinforcement, addition of fire-fighting facilities, and installation of supplementary elevators. To ensure a marked improvement in the living environment

of old residential districts and enhance residents' sense of gain, happiness and security, the local government has adopted a tailored strategy of "one district, one renovation plan" or "one plan for multiple adjacent communities". Meanwhile, renovations have been carried out centering on the "corridor renovation campaign" and "environmental improvement campaign", with full solicitation of residents' opinions prior to the launch of the projects.

Shijiazhuang has incorporated the renovation of old residential districts into the system of key livelihood projects and promoted it as a priority, with the core goal of constructing high-quality living spaces characterized by complete supporting facilities, livable human settlements, and orderly community governance. After years of sustained efforts and project implementation, along with the completion and delivery of successive batches of old residential district renovation projects, the quality of the human settlement environment in the city's old residential districts has achieved a systematic upgrade. The relevant renovation practices have not only garnered extensive recognition and positive feedback from residents, but also effectively optimized the overall spatial appearance of the city, driving the city to radiate sustainable development vitality and endogenous driving forces in the process of stock-based urban renewal.

3.2. Current Situation Characteristics of Yaxinyuan North Residential District

3.2.1. Overview of Yaxinyuan North Residential District

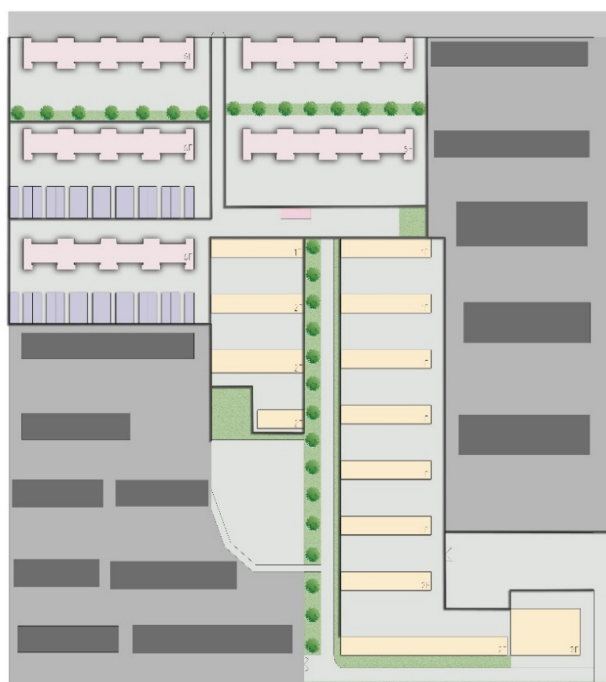


Figure 1. Current Situation Layout Plan of Yaxinyuan North Residential District

Yaxinyuan North Residential District is located at the intersection of Yuhua Road and the West Second Ring Road in Qiaoxi District, Shijiazhuang City. Constructed in 2000, it covers a total area of 38,400 square meters. Owing to its long construction history, the district has certain inherent design flaws; coupled with the changes of the times, the existing living conditions can no longer meet the current residents' living needs. In recent years, Shijiazhuang City has issued a series of policies to improve the quality of old residential districts. Starting from 2021, the Shijiazhuang Municipal

Government has formulated an annual renovation plan for a designated batch of old residential districts, which has been implemented year by year. In 2022, under the government's leadership, Yaxinyuan North Residential District underwent upgrading and renovation of its internal roads, walls, underground pipelines and gate. As a result, the district took on a completely new look, creating a clean and refreshing public environment for residents.

3.2.2. Existing Problems of Yaxinyuan North Residential District

Yaxinyuan North Residential District, built in an early period, suffers from varying degrees of contamination and discoloration on building facades, with structural damages such as corrosion and breakage occurring around window frames. Multiple potential safety hazards and functional defects are concealed inside the buildings: most residents have reported window deformation and seal failure, which tend to cause abnormal noises due to the shaking and collision of window frames in strong winds. These problems not only impair residential comfort, but also pose certain safety risks. From the perspective of building functional layout, the kitchen areas of the district are centrally arranged on the north side of the buildings and enclosed by three-sided glass structures. This results in poor thermal performance, manifesting a usage characteristic of being cold in winter and hot in summer. Worse still, no heating facilities are equipped in these areas, which has caused persistent troubles for the residents.

Furthermore, all residential buildings in this district are six-story multi-story structures without elevator installations, which have become increasingly incompatible with the current travel demands of residents, and have caused significant inconvenience especially for the elderly groups who have lived there long-term. According to the survey, the proportion of residents aged over 50 in the district is quite high. As the motor functions of this group are naturally declining, the physical cost of daily stair climbing has increased significantly. Therefore, their demand for elevator retrofitting is particularly urgent, and elevator installation has become one of the core livelihood needs for improving the livability of this district.



Figure 2. Current Building Status Map of Yaxinyuan North Residential District

A number of special heritage buildings are also preserved in Yaxinyuan North Residential District. These buildings are one-to-two-story dormitory structures constructed as supporting facilities by the original work unit prior to the construction of the district's multi-story residential buildings, and they are currently completely abandoned and left idle. Not only have these buildings long occupied the effective

spatial resources inside the district, but they have also fallen into disrepair due to the lack of continuous maintenance and management. Some of them have suffered structural damages such as wall cracks and partial collapses, along with problems like damaged or missing door and window components. From the dual perspectives of resource utilization and spatial appearance, these abandoned buildings have not only resulted in the inefficient idleness and waste of land and spatial resources in the district, but also undermined the coordination and integrity of the district's overall spatial appearance, thus constituting a significant constraint on the improvement of human settlement environment quality.



Figure 3. Current Status Map of Abandoned Buildings in Yaxinyuan North Residential District

In accordance with the Notice of the General Offices (Departments) of 12 Ministries and Commissions including the Ministry of Commerce on Promoting the Pilot Experience of the First Batch of National 15-Minute Convenient Living Circles, Launching the Application for the Fourth Batch of National Pilots and the First Batch of Pilot Areas for Comprehensive Promotion and the Code for Planning and Design of Urban Residential Districts, Shijiazhuang, as one of the first batch of pilot areas for comprehensive promotion of the 15-minute convenient living circle, shall meet the requirements specified in the aforementioned documents during the renovation of old residential districts: the 15-minute living circle shall include basic public service facilities in five fields—education, health, elderly care, culture, and sports; facilities in three areas—community commerce, park green spaces, and transportation facilities; as well as characteristic public service facilities configured in accordance with local conditions.

Based on an analysis of the current situation around Yaxinyuan North Residential District, the area within a 3-kilometer radius of the district is already equipped with facilities such as kindergartens, primary schools, supermarkets, community health service stations, and parks. However, due to inherent deficiencies in the initial design stage, the configuration of public service facilities around the district still needs to be improved.



Figure 4. Distribution Map of Surrounding Facilities in Yaxinyuan North Residential District

Firstly, there is a lack of elderly care institutions near the district. Since Yaxinyuan North Residential District is home to a majority of middle-aged and elderly residents, the absence of elderly care institutions has become an urgent issue to be addressed. Secondly, the district has very limited outdoor activity spaces for residents. Currently, only one

public fitness activity area remains in the district, which is small in size and equipped with rudimentary activity facilities. Therefore, it is necessary to increase the number of outdoor public fitness activity spaces. Additionally, the district is also short of indoor activity centers. It should set up certain indoor spaces for activities, meetings, and daily leisure and entertainment of residents. For elderly residents with limited mobility, these indoor spaces can enable them to conveniently gather for recreational activities such as singing, chess, and recitation.



Figure 5. Current Status Map of Fitness Venues in Yaxinyuan North Residential District

Amid the rapid urbanization in China today, the country's municipal greening projects have not been effectively extended to old residential areas in cities. The greening rate of Yaxinyuan North Residential District is only 10%, with large areas of hard-surface paving within the district leading to a low green coverage rate. Small patches of green space and plants are only allocated under residential buildings, but they are overgrown and unkempt due to lack of maintenance, resulting in a poor overall visual experience. Studies have shown that hard-surface paving reduces surface rainwater permeability significantly, with the runoff coefficient reaching 0.8-0.9 during heavy rains, which exacerbates the risk of waterlogging. Insufficient greenery also decreases PM2.5 adsorption capacity, leading to an air pollutant concentration 10%-15% higher in the district compared to newly built communities. Meanwhile, the surface temperature in summer is 3-5°C higher than that in green areas, forming a local heat island effect and increasing the risk of heatstroke among residents. The district's prominent characteristics of "low green space rate and high hardening degree" also exert an impact on residents' psychology: the monotonous hard interfaces are prone to causing visual fatigue, and the score of residents' psychological depression is 2.3 times higher than that in areas with abundant green plants.[12]

4. Micro-renewal Design Strategies for Yaxinyuan North Residential District

4.1. Renewal Design Strategies for Yaxinyuan North Residential District

A well-rounded renovation of old residential districts emphasizes an orderly and efficient process throughout the entire renovation cycle, where all participating entities can maintain sound communication and collaboration while supervising and facilitating each other, with the ultimate goal of ensuring residents' satisfaction with the community. To gain an in-depth understanding of the living conditions and demands of residents in the old residential district, and to

more accurately identify the direction and priorities of the district's renovation, the author adopted the methods of questionnaire survey and field investigation. After conducting on-site observations and explorations of the district, a tailored set of questionnaire items was designed and distributed among its residents, yielding a total of 51 valid responses. The questionnaire covered residents' basic information, their satisfaction levels regarding multiple aspects of the district including environmental sanitation, public facilities, property services, and public security, as well as their suggestions for improvement. Among all the respondents, residents aged 51–70 accounted for 42.31%, while those aged 31–50 made up 23.08%. In addition, 39.22% of the respondents reported having lived in the district for 11–20 years. These figures indicate that the district has a relatively stable resident population with a high proportion of long-term dwellers. Therefore, the statistical results of the questionnaire hold significant guiding value for determining the renovation direction of the district.

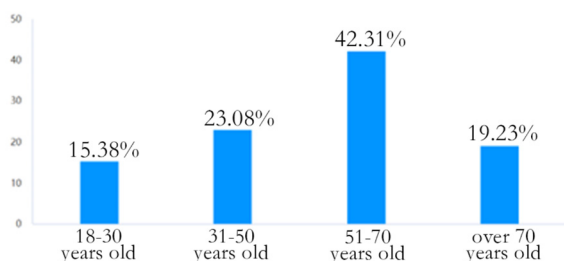


Figure 6. Age Statistics of Residents in This District

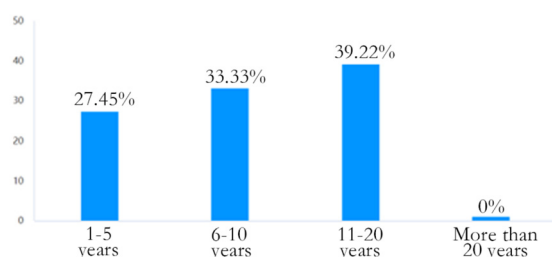


Figure 7. Statistics on Residents' Length of Residence in This District

4.1.1. Building Micro-renewal Strategies

The renovation of buildings in old residential districts should avoid modern, gaudy and avant-garde decoration, and shall be guided by the basic principles of "reinforcement", "thermal insulation" and "uniformity". Therefore, in improving the facade of this district, attention should be paid to preserving its original characteristics and avoiding unconventional designs. According to the questionnaire survey results, nearly half of the respondents indicated the need for window and door replacement or maintenance (see Figure 8). In response to this demand, the author plans to implement unified upgrading of the windows and doors in Yaxinyuan North Residential District. The renovation of windows and doors shall balance performance, cost and environmental friendliness, with priority given to selecting broken bridge aluminum windows or system windows paired with insulated tempered glass. Government subsidies will be leveraged to reduce renovation costs, and professional installation will be ensured to guarantee long-term performance. System windows feature high integration as well as superior airtightness and watertightness, making them suitable for residential buildings adjacent to streets or

elevated roads where high requirements for sound insulation and thermal insulation are imposed, though they come with relatively high costs. Since two buildings in the district are located along the street, the selection of windows may be determined with reference to residents' opinions during the renewal process.

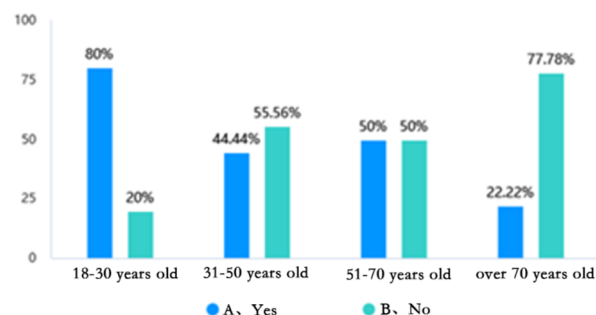


Figure 8. Statistics on the Need for Replacement or Maintenance of Windows and Doors in Residents' Homes of the District

Based on an analysis of the questionnaire survey results combined with the field investigation of the district, the author argues that the issue of elevator retrofitting should be prioritized in the future renovation of this district. According to the analysis, 80.77% of the residents support elevator retrofitting. Given the high proportion of middle-aged and elderly residents in the district, the demand for elevator installation is particularly urgent, especially for residents with limited mobility who are in greater need of elevator assistance for vertical mobility. Through an analysis of the district's current status, the author proposes three approaches to elevator retrofitting: staggered-floor entry, flat-floor entry with increased usable area per household, and external flat-floor entry.

The elevator shaft for staggered-floor entry elevator retrofitting typically does not need to extend to the entrance of each household on every floor. This reduces modifications to the building structure, minimizes damage to the original building, and results in relatively low construction costs. Meanwhile, it avoids the problem of occupying additional public or private space that is associated with flat-floor entry. Since this method does not directly alter the entry location of each household, the impact on the lighting and ventilation of lower-floor residents (especially those on the first floor) is minimal. However, this method also has obvious drawbacks: residents need to climb half a flight of stairs to reach their homes, which is still not sufficiently user-friendly for the elderly, people with disabilities, those carrying heavy items, or individuals with limited mobility, thus failing to fully achieve barrier-free access. Furthermore, the half-floor platforms of the residential buildings in this district are relatively narrow, which may cause inconvenience when moving large furniture or when multiple people pass through simultaneously.

Elevator retrofitting with flat-floor entry via area expansion eliminates the need to climb half a flight of stairs inherent in staggered-floor entry, making it particularly convenient for the elderly and people with limited mobility. In addition, each household can gain an extra 3–8 m² of usable area, which can be utilized to improve functions such as storage and entry halls. The added floor area not only enhances the living experience, but also boosts the market competitiveness of the housing units, making them easier to rent or sell. However, some cities impose strict restrictions on floor area expansion

for elevator retrofitting, coupled with complicated fire safety approval procedures. Requirements such as the width of connecting corridors and the fire separation of elevator shafts must comply with the latest fire codes, meaning that government authorities may be reluctant to approve renovation plans adopting this method. Compared with staggered-floor entry, this approach incurs higher costs both for elevator installation and subsequent maintenance, imposing a greater financial burden on homeowners.

The external flat-floor entry elevator retrofitting method, like the second approach, allows residents to enter their homes directly without climbing half a flight of stairs. Moreover, through the design of external connecting corridors or cantilevered platforms, each household can expand the space by 0.5–1.5 meters, creating an entry hall or storage area and increasing the indoor floor area. This method can also enhance the property value of old residential districts, making them particularly attractive to families with elderly members or children. While retaining the advantages of the second method, this approach has minimal impact on the original building structure. External elevators are constructed independently of the existing buildings and connected via corridors, eliminating the need for large-scale wall demolition. However, external elevators may occupy public green spaces or parking spaces, exacerbating space congestion in the district. Although the glass curtain wall design is aesthetically pleasing, some residents may perceive it as a disruption to the overall architectural style of the buildings. In terms of cost, this method is cheaper than the second approach but still slightly more expensive than the staggered-floor entry option.

Questionnaire surveys on the preferences of homeowners in this district regarding elevator retrofitting methods show that almost no one opted for the staggered-floor entry approach, while the majority of homeowners favored the external flat-floor entry method. The external approach is preferred for its minimal impact on the building structure and convenient construction process. Although the flat-floor entry with area expansion offers superior convenience, it may be rejected by some residents due to high costs or complicated approval procedures. Based on residents' preferences, priority should be given to advancing the external flat-floor entry plan. Meanwhile, policy interpretation of government subsidies should be provided to alleviate residents' concerns.

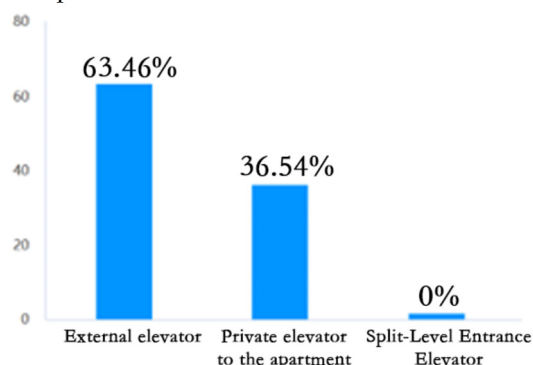


Figure 9. Statistics on Residents' Preferred Elevator Retrofitting Methods for This District

4.1.2. Public Space Micro-renewal Strategies

An analysis of the questionnaire survey results indicates that the majority of residents in this district expect the community to be cleaner and more aesthetically pleasing while having more greenery added. To address the district's characteristics of "low green space ratio and high degree of hard paving", the renovation will increase the green area. It is

planned to demolish the existing abandoned bungalows in the district, and convert the cleared land into pocket parks, thereby providing residents with a natural space for leisure and recreation. The district's internal fitness area will be renovated by clearing weeds and re-planning the space to revitalize the original fitness zone. Obsolete and damaged fitness equipment will be removed and replaced with more engaging, digitalized modern fitness facilities.

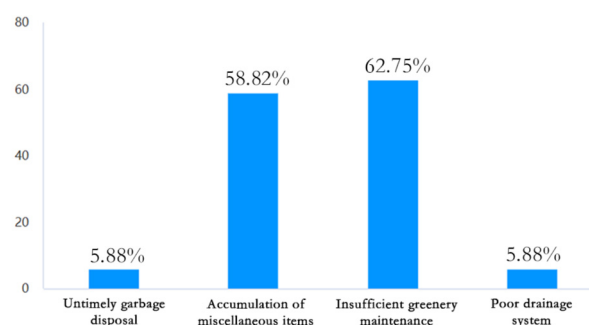


Figure 10. Statistics on the Environmental Issues That Residents of This District Most Wish to Improve

4.1.3. Service Facility Micro-renewal Strategies

This district lacks professional property management, resulting in inadequate maintenance of many public facilities. Most residents reported that the lighting conditions in the district need to be improved at night. It is proposed to systematically advance community lighting renovation through the "Safe Lighting Enhancement" project. While meeting the basic lighting demands, the project will integrate intelligent IoT technology to establish a hierarchical lighting system, thereby improving the safety level of the district. Field investigations revealed a shortage of elderly care service facilities around the district. Therefore, the existing abandoned houses in the district can be renovated and reused—a derelict two-story building is planned to be converted into a community service center. The activity hub set up in this center will provide basic elderly care facilities for the elderly and add indoor activity venues to the district, where residents can participate in recreational activities or hold meetings for discussion and decision-making. After renovation, the center will effectively meet the basic health and wellness needs of the elderly group and provide indoor public activity spaces for residents, achieving the dual goals of activating idle community resources and upgrading the level of public services.

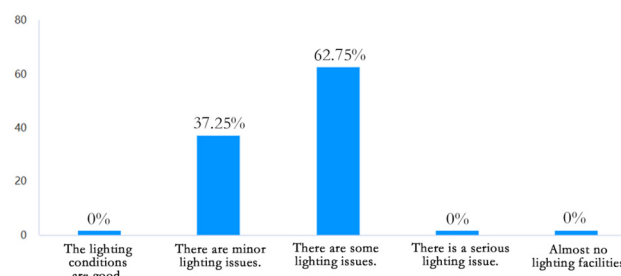


Figure 11. Statistics on Residents' Satisfaction with Public Lighting Conditions in the District

4.2. Micro-renewal Design Methods for Yaxinyuan North Residential District

In accordance with Shijiazhuang's renovation policy for old residential districts, which stipulates the principle of "one district, one plan" or "one plan for several adjacent districts",

this research attempts to formulate a set of universally applicable renovation plans for old residential districts in Shijiazhuang by designing the renovation scheme for Yaxinyuan North Residential District. Firstly, professionals from relevant disciplines are invited to conduct field investigations on the district and collect residents' opinions, so as to accurately identify the core pain points of renovation for each district. Secondly, based on policy analysis, the entry points for renovation of each district are identified, and the specific parts to be renovated are determined. Finally, the renovation plan for each district is finalized with reference to policy requirements and residents' opinions.

Firstly, a collaborative governance mechanism involving multiple stakeholders should be established. In accordance with the requirements of the Implementation Plan for the Renovation of Old Residential Districts in Shijiazhuang (Shizhengbanfa〔2020〕No.12), a joint working group led by the housing and urban-rural development authority and composed of urban planners, architects, community workers, and resident representatives shall be set up. A database of residents' renovation demands shall be established through a three-dimensional demand collection system integrating home visits, focus group discussions, and digital questionnaires.

Secondly, a two-way coupling mechanism between policy orientation and community realities should be built. With reference to the renovation standards of "basic category, improvement category, and upgrading category" specified in the Technical Guidelines for the Renovation of Old Residential Districts in Hebei Province, combined with the current situation assessment report of the district, the SWOT analysis method shall be adopted to clarify the priority of renovation. Priority shall be given to addressing core issues such as roof leakage, pipeline aging, and lack of barrier-free facilities, while synchronously planning community aging-friendly renovation and smart community construction.

Finally, a dynamically optimized scheme generation mechanism should be formed. A 3D renovation model shall be constructed based on BIM technology. Scheme comparison meetings shall be held through the community hall, and expert demonstration shall be conducted by applying the Delphi method. Eventually, a "1+3+N" renovation scheme system shall be formed, namely 1 overall planning scheme, 3 special implementation schemes covering building renovation, environmental improvement, and smart empowerment, and N flexible adjustment modules.

5. Conclusion and Prospects

Taking Yaxinyuan North Residential District in Shijiazhuang as the practical case, this study, grounded in the theory of urban micro-renewal, explores a regeneration path

for old communities featuring "precision diagnosis, incremental renewal, and co-governance empowerment". In the renovation process, an "acupuncture-style" minimally invasive intervention strategy is implemented, with targeted renovation schemes designed focusing on the high-frequency demands of the district, so as to improve the utilization rate of public spaces and residents' satisfaction with the renovation. Against the dual backgrounds of the coordinated development of the Beijing-Tianjin-Hebei region and the urban renewal initiative during the 14th Five-Year Plan period, the micro-renewal strategies proposed in this study can not only provide renovation ideas for Yaxinyuan North Residential District, but also contribute to the theoretical system of urban organic renewal in China in the new era, helping Shijiazhuang build itself into a resilient, warm and competitive modern provincial capital city.

References

- [1] Lijie Huang, Wei Zheng, Jingke Hong, Yong Liu, Guiwen Liu, Paths and strategies for sustainable urban renewal at the neighbourhood level: A framework for decision-making,
- [2] Tang, D., X. Gong, and M. Liu. 2022. "Residents' Behavioral Intention to Participate in Neighborhood Micro-Renewal Based on an Extended Theory of Planned Behavior: A Case Study in Shanghai, China." *Habitat International* 129:102672.
- [3] Lu, W., B. Qiu, and Y. Wu. 2024. "Exploration of Urban Community Renewal Governance for Adaptive Improvement." *Habitat International* 144:102999.
- [4] Haowei P A N. RESEARCH ON PUBLIC SPACE DESIGN IN OLD COMMUNITIES BASED ON THE PERSPECTIVE OF MICRO-RENEWAL[J]. 2023.
- [5] Zheng, H.W.; Shen, G.Q.; Wang, H. A review of recent studies on sustainable urban renewal. *Habitat Int.* **2014**, *41*, 272–279.
- [6] Westin, M. The framing of power in communicative planning theory: Analysing the work of John Forester, Patsy Healey and Judith Innes. *Plan. Theory* **2022**, *21*, 132–154.
- [7] Blakeley, G. Governing Ourselves: Citizen Participation and Governance in Barcelona and Manchester. *Int. J. Urban Reg. Res.* **2010**, *34*, 130–145.
- [8] Zheng, W.; Shen, G.Q.; Wang, H.; Hong, J.; Li, Z. Decision support for sustainable urban renewal: A multi-scale model. *Land Use Policy* **2017**, *69*, 361–371.
- [9] Ansell, C.; Gash, A. Collaborative Governance in Theory and Practice. *J. Public Adm. Res. Theory* **2007**, *18*, 543–571.
- [10] Emerson, K.; Nabatchi, T.; Balogh, S. An Integrative Framework for Collaborative Governance. *J. Public Adm. Res. Theory* **2012**, *22*, 1–29.
- [11] Zhang C X. Age-Friendly Design of Public Spaces in Aging Residential Communities from a Micro-Renewal Perspective [J]. *Sustainable Development Research*, 2025, 7(2): p143-p143.
- [12] Liu, W., et al. "Green Space Cooling Effect and Contribution to Mitigate Heat Island Effect of Surrounding Communities in Beijing Metropolitan Area." *Frontiers in Public Health* (2022).