

# *Thinking in the Post-epidemic Era: Methods and Implementation of Resilient City Construction in the State of Urban Renewal*

Cheng Zhang<sup>\*</sup>, Hua Jin, Jing Liu

*School of Art and Design, Wanjiang University of Technology, Ma'anshan, China*

*zhangcheng820@yeah.net*

*\*corresponding author*

**Keywords:** post-epidemic era; Urban renewal; Resilient city construction; Public health safety; Urban spatial toughness

**Abstract:** At the beginning of 2020, the outbreak of COVID-19 has made many cities around the world re-examine the health and well-being of citizens, urban planning and construction, emergency governance and sustainable development in a state of crisis, and the topic of urban resilience has also returned to everyone's discussion. In recent years, the population flow and gathering under the wave of urbanization have greatly increased the risk of urban public health security. In the face of sudden public health events such as the novel coronavirus and SARS, a city's response reflects whether its physical space layout is reasonable, management and governance is scientific and effective, and social coordination is flexible. How to make the city have a complete set of implementation plans in response to sudden disasters, have adequate response measures, and can quickly recover vitality after the event, is the focus of urban resilience construction. As we all know, a city is a super system coupled by a number of complex systems. The high-speed development of transportation and the Internet makes the connections within and between systems more extensive and complex. Therefore, the design based on urban resilience should not only pay attention to the operation of urban subsystems, but also pay attention to the interaction and balance among subsystems. The 14th Five-Year Plan clearly states that we should conform to the new concepts and trends of urban development, build resilient cities, and enhance the resilience of urban security. The report of the Party's 20th National Congress once again emphasized the implementation of urban renewal actions, strengthening urban infrastructure construction, and building livable, resilient, and smart cities, which pointed out the direction for the comprehensive construction of resilient cities. Under the impact of rapid urbanization and industrial structure adjustment, China's cities have gradually presented problems such as fragmentation and overlap of urban space, lagging urban infrastructure construction, and hollowing out of urban economy. How to build a "safe city" in the "stay, reform and demolition" and let "toughness" integrate into the "bone marrow" of the city is an important topic at present. This paper first analyzes the challenges faced by urban renewal and resilient city construction in the post-epidemic era,

then discusses the core elements of resilient city construction, and finally puts forward specific methods, implementation approaches and strategies for resilient city construction under the state of urban renewal, so as to improve the city's ability to withstand disasters, ensure urban security and stability, and promote urban sustainable development.

## 1. Introduction

With the accelerated development of globalization and urbanization, cities, as the main places of human activities, are facing more and more challenges and impacts. In recent years, sudden public health events such as the outbreak of COVID-19 have exposed the vulnerability of cities in responding to crises. How to build a resilient city and improve its resilience and resilience in urban renewal has become an important issue in urban planning and construction.

## 2. Overview of resilient cities

Resilient City is a comprehensive urban development concept that originates from the study of ecosystems and is gradually applied to the context of urban development. Urban resilience refers to the ability of individuals, communities and systems in a city to survive, adapt and grow under various chronic pressures and acute shocks. It mainly includes seven characteristics, namely, reflective power, flexibility, robustness, redundancy, adaptability, inclusiveness and synergy<sup>[1]</sup>. The basic framework of resilient cities includes four dimensions: health and well-being, economy and society, infrastructure and environment, and urban leadership and strategy (Table 1). The concept of resilient city has been frequently used in the field of disaster prevention and reduction in the international community, and has become one of the important indicators to measure the level of sustainable urban development.

*Table 1 Basic framework of resilient cities*

Dimensionality	Subdimension
Health and well-being	Population health, medical services, social equity and inclusion
Economy and society	Economic development, employment opportunities, social cohesion, culture and education
Infrastructure and environment	Energy and Transportation, water resources management, Communications and Information Technology, built environment, Natural disasters and climate change, Environmental quality and ecosystems
Urban leadership and strategy	Policy development and implementation, planning and management, emergency preparedness and response, community participation and governance

## 3. Challenges of urban renewal and resilient city construction in the post-COVID-19 era

### 3.1 Urban space is fragmented and overlapping, and infrastructure lags behind

Under the impact of rapid urbanization and industrial structure adjustment, Chinese cities

gradually show problems such as fragmentation and overlap of urban space and lagging urban infrastructure construction<sup>[2]</sup>. The fragmentation and overlap of urban space lead to the unreasonable layout of urban functions, traffic congestion, environmental pollution and other problems become increasingly prominent. At the same time, the lag of urban infrastructure also restricts the sustainable development of cities. For example, the renovation of infrastructure such as water supply, power supply and gas supply lags behind and cannot meet the needs of urban development.

### **3.2 The urban economy is hollowed out and the industrial structure is single**

With the advancement of urbanization, the phenomenon of economic hollowing appears in some cities. These cities often rely on traditional industries and lack the support of emerging and innovative industries, resulting in insufficient impetus for urban economic development<sup>[3]</sup>. The single industrial structure also increases the vulnerability of the urban economy, once the traditional industry is affected, the urban economy will face a huge risk.

### **3.3 The public health safety system is not perfect**

The outbreak of sudden public health events exposed the imperfection of China's public health safety system. Some cities lack effective prevention and control measures and emergency plans when dealing with the epidemic, leading to the rapid spread of the epidemic. In addition, the shortage and uneven distribution of urban medical resources also aggravate the risk of public health security.

### **3.4 Insufficient capacity of social governance**

The lack of urban social governance capacity is also one of the challenges facing the current urban renewal and resilient city construction. Some cities lack effective coordination mechanism and emergency response ability when dealing with emergencies, resulting in social disorder<sup>[4]</sup>. At the same time, the weakness of urban community governance also restricts the improvement of urban resilience.

## **4. Core elements of resilient city construction**

### **4.1 Urban spatial resilience**

Urban spatial resilience refers to the ability of a city to maintain the integrity and stability of urban spatial structure and ensure the normal operation of urban functions in the face of external impacts<sup>[5]</sup>. The construction of urban spatial resilience needs to start from urban spatial layout, transportation network, green space system, etc., to improve urban resilience and resilience.

#### **(1) Urban spatial layout**

Reasonable urban spatial layout is the basis of urban spatial resilience. Cities should formulate scientific urban spatial planning according to their own characteristics and needs, optimize the layout of urban functions, and improve the utilization efficiency of urban space. At the same time, the city should strengthen the urban fringe and old urban renewal, improve the quality and vitality of urban space.

#### **(2) Transportation network**

Transportation network is an important component of urban spatial resilience. The city should build a perfect transportation network system to improve the connectivity and reliability of the

transportation network. At the same time, the city should strengthen the prevention and management of traffic congestion and traffic accidents to ensure the smooth and safe traffic network.

#### (3) Green space system

Green space system is an important support for urban spatial resilience. Cities should strengthen the planning and construction of green space system to improve the coverage and quality of urban green space. At the same time, the city should strengthen the management and maintenance of green space system to ensure the ecological function and landscape effect of green space.

### 4.2 Urban economic resilience

Urban economic resilience refers to the ability of cities to maintain stable economic growth and sustainable development in the face of external shocks. The construction of urban economic resilience needs to improve the competitiveness and adaptability of cities from the aspects of industrial structure, innovation system and market system<sup>[6]</sup>.

#### (1) Industrial structure

Reasonable industrial structure is the basis of urban economic resilience. Cities should formulate scientific industrial development plans and optimize the layout of industrial structure according to their own characteristics and advantages. At the same time, cities should strengthen the transformation and upgrading of traditional industries and the cultivation and development of emerging industries to improve the added value and competitiveness of industries.

#### (2) Innovation system

Innovation system is an important support for urban economic resilience. The city should build a perfect innovation system, strengthen scientific and technological innovation and personnel training, and improve the innovation ability and competitiveness of the city. At the same time, cities should strengthen the transformation and application of innovation achievements and promote the industrialization of innovation achievements.

#### (3) Market system

The market system is an important guarantee for the resilience of urban economy. The city should build a perfect market system, strengthen market supervision and regulation, and improve the transparency and fairness of the market. At the same time, the city should strengthen the prevention and response to market risks to ensure the stability and sustainable development of the market.

### 4.3 Urban social resilience

Urban social resilience refers to the ability of a city to maintain social stability and harmony in the face of external shocks. The construction of urban social resilience needs to start from the aspects of social governance, community governance, public security, etc., and improve the city's social governance ability and response ability.

#### (1) Social governance

Social governance is the foundation of urban social resilience. Cities should strengthen the top-level design and system construction of social governance, and improve the scientific and effective social governance. At the same time, the city should strengthen the supervision and evaluation of social governance to ensure the quality and effectiveness of social governance.

#### (2) Community governance

Community governance is an important support for urban social resilience. The city should strengthen the guidance and support for community governance and improve the level and capacity of community governance. At the same time, the city should strengthen the participation and

interaction in community governance to enhance the sense of belonging and identity of community residents.

(3) Public safety

Public safety is an important guarantee for the resilience of urban society. The city should strengthen the supervision and prevention of public safety and improve the level and ability of public safety. At the same time, the city should strengthen the publicity and education of public safety, improve citizens' safety awareness and self-rescue ability.

**5. Methods and implementation of resilient city construction under the state of urban renewal**

**5.1 Implementation of urban spatial resilience renewal**

(1) Overall utilization of ground and underground space

In order to avoid possible risks, appropriate space and leeway should be reserved. Disaster prevention zones and open Spaces should be improved in terms of spatial layout for important urban infrastructure and crowded places, and three-dimensional evacuation and rescue channels should be built<sup>[7]</sup>. Strengthen the functional transformation of public building platforms such as schools and large sports stadiums, and the construction of comprehensive emergency shelters.

(2) Implement urban renewal by combining gray infrastructure such as transportation, water supply and power supply with green infrastructure such as ecological corridors and parks

Combining traditional gray infrastructure (such as transportation, water supply and power supply systems) with modern green infrastructure (such as ecological corridors and green parks) is an important direction for urban spatial resilience renewal<sup>[8]</sup>. Cities should strengthen the renovation of grey infrastructure and the planning and construction of green infrastructure to improve the resilience and resilience of urban infrastructure. At the same time, the city should strengthen the coordinated management of gray infrastructure and green infrastructure to ensure the coordinated development and efficient operation of urban infrastructure.

**5.2 Implement renewal of urban economic resilience**

(1) Speed up the renewal of inefficient idle space in urban areas

Urban inefficient idle space is an important area of urban economic resilience renewal. Cities should strengthen the investigation and evaluation of inefficient idle space in urban areas, and formulate scientific renovation plans<sup>[9]</sup>. At the same time, the city should strengthen the utilization and development of inefficient idle space to improve the utilization efficiency and economic benefits of urban space (Table 2).

*Table 2 Table of renewal measures of inefficient restricted space in urban areas*

Measure	Description
Investigation and evaluation	Strengthen the investigation and evaluation of inefficient idle space in urban areas to understand its specific distribution, scale and utilization potential
Make a plan	According to the investigation and evaluation results, develop a scientific renovation plan
Utilization and development	Strengthen the utilization and development of inefficient idle space, and improve the utilization efficiency and economic benefits of urban space

(2) Foster diversified development of new business forms

The diversified development of new business forms is an important direction for the renewal of urban economic resilience. Cities should strengthen the cultivation and development of new business forms and promote the integrated development of traditional industries and emerging industries. At the same time, the city should strengthen the supervision and service of new business forms to ensure the healthy and sustainable development of new business forms.

(3) Promote the construction of new consumer areas in cities

The construction of new urban consumer business district is an important measure of urban economic resilience renewal. Cities should strengthen the planning and construction of new consumer business areas to improve the agglomeration degree and competitiveness of urban commerce. At the same time, the city should strengthen the cultivation and support of new consumer business circles, and promote the innovative development and transformation and upgrading of urban commerce.

### 5.3 Implement resilience renewal of urban projects

(1) Promote the integration of urban lifeline projects and natural ecology

The integration of urban lifeline engineering and natural ecology is an important direction of resilience renewal of urban engineering. Cities should strengthen the renovation of urban lifeline engineering and the protection and restoration of natural ecology, so as to improve the resilience and recovery ability of urban lifeline engineering<sup>[10]</sup>. At the same time, the city should strengthen the coordinated management of urban lifeline engineering and natural ecology to ensure the coordinated development and efficient operation of urban lifeline engineering and natural ecology.

(2) Upgrade the level of intelligent new infrastructure projects

The upgrading of the update level of intelligent new infrastructure projects is an important measure for the resilience renewal of urban engineering. The city should strengthen the planning and construction of intelligent new infrastructure projects to improve the intelligent level and operation efficiency of urban infrastructure. At the same time, the city should strengthen the supervision and services of intelligent new infrastructure projects to ensure the healthy and sustainable development of intelligent new infrastructure projects.

### 5.4 Implement resilience renewal of urban communities

(1) Enhance the spatial resilience of urban communities

The spatial resilience of urban community is the basis of urban community resilience renewal. The city should strengthen the planning and construction of urban community space to improve the quality and vitality of urban community space. At the same time, the city should strengthen the management and maintenance of urban community space to ensure the cleanliness and safety of urban community space.

(2) Strengthen community governance and services

Strengthening community governance and service is an important direction for urban community resilience renewal. The city should promote the innovation of community governance system and build a community governance pattern with the participation of government, society and residents. By improving the level of community service, the residents' sense of belonging and satisfaction can be enhanced, and the self-repair and self-development ability within the community can be formed.

(3) Improve the community emergency management system

The improvement of community emergency management system is the key link of urban community resilience renewal. The city should strengthen the planning and construction of community emergency management, establish and improve the community emergency plan and emergency response mechanism. Through strengthening community emergency drills and training,



improve the emergency self-rescue ability of community residents and the emergency handling ability of the community.

### **5.5 We will renew resilience in urban governance**

#### **(1) Building a smart governance system**

The construction of smart governance system is an important direction for the renewal of urban governance resilience. Cities should strengthen the research and development and application of smart governance technology, and promote the digitalization, intelligence and refinement of urban governance. Through the construction of the smart governance system, the efficiency and accuracy of urban governance will be improved, and the coping ability and adaptability of urban governance will be enhanced.

#### **(2) Promoting diversification of governance entities**

The diversification of governance subjects is an important measure for the renewal of urban governance resilience. Cities should strengthen the cultivation and support of governance subjects, and promote the joint participation and collaborative governance of multiple subjects such as the government, enterprises, social organizations and residents. Through the diversification of governance subjects, the flexibility and inclusiveness of urban governance will be enhanced, and the efficiency and satisfaction of urban governance will be improved.

#### **(3) Strengthen policy and legal support**

The support of policies and regulations is an important guarantee for the renewal of urban governance resilience. Cities should strengthen the formulation and improvement of relevant policies and regulations on urban governance resilience renewal, and clarify the goals and tasks of urban governance resilience renewal. At the same time, strengthen the publicity and interpretation of policies and regulations, improve the awareness and implementation of policies and regulations, and provide a strong legal guarantee for the renewal of urban governance resilience.

## **6. Implementation strategy of resilient city construction under the state of urban renewal**

### **6.1 Strengthen planning and guidance**

Planning guidance is the basis of resilient city construction under the state of urban renewal. Cities should strengthen the planning and implementation of urban renewal and resilient city construction, and clarify the goals and tasks of urban renewal and resilient city construction. Through planning guidance, promote the coordinated development of urban renewal and resilient city construction, and achieve the optimal layout and improvement of urban space functions.

### **6.2 Improve the policy system**

The improvement of the policy system is an important guarantee for the construction of resilient cities under the state of urban renewal. Cities should strengthen the formulation and improvement of policies related to urban renewal and resilient city construction, and clarify the direction and objectives of policies. At the same time, the implementation and supervision of the policy should be strengthened to ensure that the policy takes root and is effectively implemented. Through the improvement of the policy system, we will provide a strong policy guarantee for urban renewal and the construction of resilient cities.

### 6.3 Strengthening financial security

Financial security is an important support for the construction of resilient cities under the state of urban renewal. Cities should strengthen funding and investment in urban renewal and resilient city construction to ensure the smooth implementation and landing of projects. At the same time, the supervision and use of funds should be strengthened to improve the efficiency and effectiveness of the use of funds. Through funding guarantee, we will provide strong financial support for urban renewal and the construction of resilient cities.

### 6.4 Promoting social participation

Social participation is an important driving force for resilient city construction in the state of urban renewal. Cities should strengthen guidance and incentives for social participation, and encourage all sectors of society to actively participate in urban renewal and resilient city construction. By strengthening social participation, we will form a pattern of joint participation of multiple entities such as the government, enterprises, social organizations and residents, and promote the smooth progress of urban renewal and the construction of resilient cities.

### 6.5 Strengthen international cooperation and exchanges

International cooperation and exchange is an important way to build resilient cities in the state of urban renewal. Cities should strengthen the promotion and deepening of international cooperation and exchanges, learn from international advanced experience and practices, and improve the level and quality of urban renewal and resilient city construction. At the same time, we actively participate in international exchanges and cooperation, and promote the internationalization process of urban renewal and resilient city construction.

## 7. Conclusion

The construction of resilient cities under the state of urban renewal is an important measure to deal with the challenges in the post-epidemic era. Through the implementation of urban spatial resilience renewal, urban economic resilience renewal, urban engineering resilience renewal, urban community resilience renewal and urban governance resilience renewal, we can build a resilient urban system and improve the resilience and resilience of cities. At the same time, strengthening planning guidance, improving the policy system, strengthening financial security, promoting social participation and strengthening international cooperation and exchanges can provide strong support and guarantee for the construction of resilient cities under the state of urban renewal. In the future urban development, more attention should be paid to the construction of resilient cities, and the concept of resilience should run through the whole process of urban planning, construction and management. Through continuous exploration and practice, we will promote the construction of resilient cities under the state of urban renewal to achieve greater achievements, and make greater contributions to the sustainable development of cities and the better life of the people.

## Acknowledgements

2022 Anhui Provincial Department of Education Major Social Science Research Project "Healthy City" Concept: Green Space Layout Planning, Effect and Element Analysis of Urban Built up Areas (2022AH040310), Anhui Provincial Department of Education 2024 Action Plan for the Training of Young and Middle aged Teachers "Domestic Visiting and Training Funding Project for



Young Backbone Teachers" (JNFX2024098),Wanjiang University of Technology 2022 School level Demonstration Experimental Training Center "Urban and Rural Human Settlements Sustainable and Ecological Environment Engineering Technology Experimental Training Center" (zl202235),Open Fund Project of Key Laboratory of Landscape Ecological Restoration Research in Ma'anshan City in 2024 "Spatial Distribution and Driving Factors Analysis of Urban Landscape Pattern" (YGYS24001),2023 Anhui Province Quality Engineering Teaching Innovation Team Construction "Landscape Design Teaching Innovation Team" (2023cxtd127).

## References

- [1]Cui P ,You Z ,Shi Q , et al.*Research on the Factors Influencing the Epidemic Resilience of Urban Communities in China in the Post-Epidemic Era*[J].*Buildings*,2024,14(9):2838-2838.
- [2]Lazarevic E V , Kekovic Z , Antonic B . *In search of the principles of resilient urban design: Implementability of the principles in the case of the cities in Serbia*[J]. *Energy and Buildings*,2018,158(PT.2):1130-1138.
- [3]Borham O ,Croxford B ,Wilson D .*Biomimetic Strategies for Sustainable Resilient Cities: Review across Scales and City Systems*.[J].*Biomimetics (Basel, Switzerland)*,2024,9(9):514-514.
- [4]Han S ,Wang H ,Ao Y , et al.*Resilient city construction efficiency and its influencing factors in China's Chengdu-Chongqing Economic Circle: Considering both construction input and resilience level of the city*[J].*Sustainable Cities and Society*,2024,114105726-105726.
- [5]Kostešić I .*Resilient Urban Communities: A Case Study of the Cyjetno Housing Estate, a Modern Period Predecessor in Urban Planning in Croatia*[J].*Urban Science*,2024,8(3):102-102.
- [6]Nikitas A ,Bakogiannis E .*Editorial: Urban transport, resilient cities and Covid-19: Testing mobility interventions for a disrupted world*[J].*Cities*,2024,152105183-.
- [7]Liu J ,Wang C ,Zhang R .*Experiment in resilient city: An evaluation of China's demonstration city of safe development policies*.[J].*Heliyon*,2024,10(11):e32000-e32000.
- [8]McDonnell R D ,Aragón F L D V M ,McDonnell R L , et al.*Toward Resilient Urban Design: Pedestrians as an Important Element of City Design*[J].*Urban Science*,2024,8(2):65-65.
- [9]Tarashkar M ,Qureshi S ,Wang Z , et al.*Public perceptions towards urban horticulture in front-yard greenhouses: Unveiling ecosystem services and practices for sustainable and resilient city*[J].*Sustainable Futures*,2024,7100205-.
- [10]Northridge M E, Sclar E. *A Joint Urban Planning and Public Health Framework: Contributions to Health Impact Assessment*[J].*American Journal of Public Health*, 2003,93(1):118.