

## *Resilient Design of Public Space in Older Communities of Shanghai*

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### **Abstract**

Sustainable Cities and Communities have been identified as a future international urban development objective by the United Nations Centre for Sustainable Development (UNCSD). And as an integral component of urban development, community resilience is one of the most important indicators of a city's sustainable development level. Shanghai saw an outbreak and rapid spread of the COVID-19 pandemic in 2022, prompting the government to create a home quarantine regime with grid-based control. The abrupt adoption of the community isolation system revealed challenges with management models, service systems, and environmental maintenance, particularly in older communities. Public space is essential for sustaining the lives of residents, maintaining public health, and fostering social connections. In the face of episodic social events, public places play a crucial role in minimizing shocks, absorbing risks, and aiding restoration. This demonstrates the significance of public space in fostering resilient communities and optimizing community governance. In this paper, we examine the environmental measurements of community pandemic prevention and control, as well as the residents' mental condition, before proposing constructing a "symbiosis station" by integrating the features of resilient communities. Under the concept of government-led and multi-governance, this study seeks to establish functional transitions for different usage scenarios to fulfil the needs of ordinary life improvement and emergency defence, thereby forming a highly self-organized, self-adaptive, and self-developing community. This research chooses Shanghai Hongqiao Airport New Village as an experimental intervention location to demonstrate two survival strategies of the "symbiosis station" to test the design strategy's viability.

Keywords: Resilient Community, Public Space, Functional Transition

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# **1 Introduction**

## **1.1 Introducing the problem**

With strong and rapid national countermeasures, the COVID-19 epidemic has gradually entered a phase of coexistence with the community. In the face of this prolonged, large-scale public health event, the community's networked management of home quarantine played a critical role in the rapid distribution, assembly, and mobilization of personnel, supplies, and outbreak information. However, home quarantine is a "double-edged sword." The community's vulnerability becomes more apparent as the quarantine period increases. The community's vulnerability becomes more evident as the time of isolation increases, such as overcrowding of public space, exposure of security risks, intensification of community conflicts, and confusion in resource allocation. The causes of this vulnerability can be divided into historical and empirical factors. In the early days, the state had a loose economic policy to achieve the goal of urbanization quickly, which led to the formation of many crude communities for commercial interests, leaving behind problems such as unreasonable planning, serious homogenization, and widespread illegal construction. In addition, the country is in a state of "practice while learning" in the fight against the epidemic, and it is difficult to achieve "all-around" strategic deployment. In the long run, the physical environment will be damaged, and the social environment will be disrupted. During the 14th Five-Year Plan period, China's residential housing will make full use of public resources to promote the pace of urban renewal, and resilient communities appeared in the public eye at this time. Therefore, how to grasp the policy opportunity in the post-epidemic era and use the transformation of public space resources to adapt to the residents' normalized and diversified living patterns and occasional public events defense patterns to enhance the community environment and residents' psychological resilience level is an important issue today.

After collecting and reading related literature, it is found that there is a lack of methods and concrete practices for environmental remediation and spiritual healing in post-disaster communities when dealing with community problems. Therefore, this paper analyzes the components of public space and individual mental resilience by understanding the characteristics of resilient communities and compares them with the state of old communities under the epidemic quarantine system in Shanghai, to summarize the shortcomings and directions for improving the current state of old communities. Finally, the author simulates the different usage scenarios of the public space after the renovation by designing a "symbiosis station" in Shanghai Hongqiao Airport New Village.

## **1.2 Resilience Theory**

### **1.2.1 Origin of the Concept of Resilience**

The term "resilience" is derived from the Latin term "Resilio," which refers to a system's ability to adapt to change and survive [1]. This term was initially used in engineering to refer to the return of a system to its original state after it has been damaged. Subsequently, the term has been extended to ecology, emphasizing "dynamic equilibrium", which refers to the process of system-level turnover in which an ecosystem reaches a more stable equilibrium than before when it is disturbed by external disturbances. The term "resilience" was first used to describe social systems in 1990, and it relates to how local social resources may be used by citizens to rebuild their sense of community and capacity to survive when a city's functionality is harmed by natural catastrophes. Furthermore, the notion of resilience has been extended to economics and psychology, and its fundamental lineage is examined in

terms of "how to adapt to change." It can be observed from the history of the idea of "resilience" from engineering to many fields that resilience cognition progressively grows from a single equilibrium state to numerous equilibrium states, and the resilience system gradually transforms from simple to complex.

This research focuses on social-ecological resilience, which blends psychology and ecology in the context of community rejuvenation, emphasizing the interrelationships between disruptions and reorganizations within and beyond the community. The "minimum operational ability" of the community will be strengthened to build a more stable community state through mutual learning and innovation amongst internal systems. To guarantee that the community has more robust adaptability to continue fundamental living operations in the face of negative developments.

### 1.2.2 The Current State of Development of Resilient Community Theory

Since the 21st century, various natural and economic disasters have frequently occurred worldwide. As the most complex ecological and social system, cities are prone to form a chain reaction in the face of sudden disasters. Therefore, scholars have started to pay attention to the concept of resilient cities and apply the "defense-absorption-learning-growth" model of resilience theory to urban governance in order to achieve dynamic and multiple equilibrium states. As one of the essential carriers of urban industries and population, the community is an important medium linking different organizational modules of the city and is the primary object of research in resilient city systems.

Most scholars summarize community resilience as one or several capacities or processes, while others view it as the result of capacity acquisition or successful adaptation, both as a collection of capacities and as a process of community capacity enhancement and disaster adaptation [2]. This research focuses on community resilience as an expression of the ability to cope with social change. This capacity has four main characteristics:

**Self-Control.** Refers to a community system's capacity to withstand calamities and continue to carry out its fundamental duties in the face of extreme trauma and upheaval.

**Self-Recovery.** Refers to the return to standard capacity after disruption of community function.

**Self-Organization.** Refers to the connection and interaction between the various systems of the community so that when a single or local system is damaged, system reorganization and resource deployment can be carried out quickly to fill the system gap promptly.

**Self-Adaptive.** Refers to the community's ability to learn and build new systems to adapt to a new social environment.

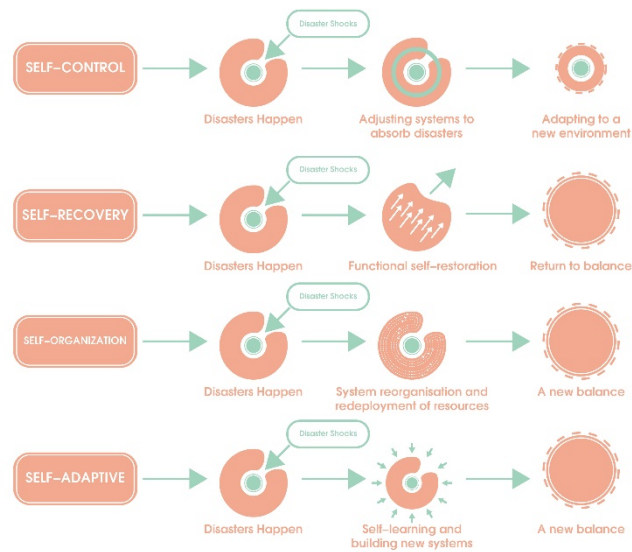


Figure 1: Analysis chart of the four characteristics of resilient communities

### 1.2.3 Components of personal resilience

COVID-19 has put an unprecedented strain on all in society. It has caused problems such as widespread unemployment and life status changes that continue draining individuals of their internal resources. The American Psychological Association (APA) believes that individual resilience requires adjustment through mental, emotional, and behavioral resilience and internal and external demands. The most critical factors to enhance personal resilience can be divided into three points. The author will elaborate on them in relation to the state of the residents during the epidemic.

**Correct Values and Ways to Interact With the Community.** COVID-19 is a constant and ever-changing battle. As the largest group of residents with the least amount of medical resources and information, they are prone to negativity and anxiety and vent these emotions to their families or other surrounding groups, which can undermine the stability of community relationships and make community management difficult. Therefore, residents need to correctly view the policies and measures implemented by the state and the community during community isolation, maintain timely and effective information and communication with the community, and actively participate in health education presentations and other participatory activities organized by the community. At the same time, they need to accept and use the ecological dispersal of people, reach out to diverse communities, and keep their social groups dispersed and mixed rather than fixed.

**Available Social Resources.** An individual's social resources are generally divided into tangible resources, such as material and financial resources, and intangible resources, such as knowledge, social relationships, and technology [3]. The richer the variety of social resources an individual has, the more channels they have to drain their emotions and learn to absorb them, and the stronger their psychological resilience. However, many tangible resources are in a passive state of depletion during quarantine, so it is essential to promote mutually trusting social networks, foster social relationship leadership, cultivate more interests, and form multiple interest groups to increase new social resources.

**Innovative Solutions.** An individual's resilience is variable and constrained. An individual's potential for resilience will temporarily increase when they experience abrupt environmental changes. However, when the stress of change intensifies over time, the body's tolerance level drops to zero, causing the body's mental and physical health to be compromised or leading to a stress disorder. Every home and community becomes an island while under quarantine. When residents' behavior and social interactions are restricted, they must look into more diverse stress-relieving strategies, such as setting short-term goals that are doable and feeling proud of themselves after they are accomplished. Alternately, volunteer in the community or manage a facility to aid others while fostering interpersonal relationships and self-worth. Or ask others for assistance. When people are stressed, receiving the correct service from the outside world can be extremely important for developing personal resilience.

### **1.2.4 Components of Community Public Space Resilience**

Community public spaces are areas that promote goodwill, mitigate the effects of disasters, and improve quality of life. The way public spaces are created, managed and used reflects a place's culture, structure, and social hierarchy, highlighting the significance of a positive public image and a welcoming social climate for preserving and improving community resilience. The attributes of the community itself determine the resilience characteristics of public space [4]. The spatial pattern and environmental composition in a community reflect the community's resilience, and its main components are the integrity of infrastructure, the diversity of spaces and the flexibility of functions.

**Integrity of Infrastructure.** Infrastructure typically encompasses both public and social facilities, such as those related to education, research and technology, and health care, as well as public facilities like the power system, communications, and water supply [5]. These facilities are necessary for the community's healthy functioning, ensuring residents' basic safety and convenience. In times of community change, they respond, recover, and learn to restore the functioning of the community's public spaces. However, the physical and geographical layout, the economy, and a sensible management system all play a role in infrastructure improvement, and their interdependence impacts and regulates one another. Infrastructure must be customized to the local geographic, political, and cultural contexts and requires long-term consultation and planning.

**Diversity of Space.** First and foremost, the term "diversity of space" refers to the range of spatial uses, such as cultural centers and leisure areas, which give locals a variety of outdoor experiences, improve the standard of community life, and fortify social networks. Second, it refers to community ecological variety, which upholds and safeguards local species, fosters beneficial interspecies connections, and establishes a positive cycle of resource and energy efficiency. Ecological diversity enhances both community ecology and resident spirits. It also refers to several activity patterns that can produce a range of group activities based on different community conditions to generate a warm and welcoming community culture that can aid locals in banding together as a solid force to fight against calamities.

**Flexibility of functions.** The community must be able to adapt swiftly to unforeseen circumstances and return to a stable state. This means that the layout, structure, and connection of the environment's facilities and spaces must be able to respond to a variety of community scenarios and take into account the needs of ordinary living and emergencies. The environment's flexibility also gives time and avenues for people's mental and life rehabilitation following a traumatic event. The environment's flexibility necessitates taking

full use of the community's regional and geographical characteristics, such as employing some roads as epidemic-proof corridors during community quarantine to improve the safety of material transit and everyday mobility. It also necessitates the participation of community organizations that can arrange for specific personnel to maintain equipment and facilities in the new environment or host events such as awareness sessions and relief meetings to help residents comprehend the changes and facilitate their adaptation.

## **2 Status of Shanghai's Old Communities During the Epidemic**

In reaction to a sudden and enormous Omicron infection in the spring of 2022, Shanghai adopted a comprehensive process of static management, and the city's production and life entered an unconventional condition. The government has created a grid-based community management system that separates areas with varying degrees of infection into "containment," "control," and "prevention" zones in order to meet the objective of lowering the number of infected individuals as quickly as feasible. The prompt community reaction in Shanghai avoided a mass infection, but new positive infections continue to emerge in stages, and most affected individuals reside in older areas. The Shanghai CDC analyzed that one of the reasons for this is the weak health and safety of older communities. There are more difficult aspects that can easily spread the virus, such as high population density, poor sanitary conditions, and common sharing of toilets and kitchens. This situation shows that the current old communities are still some distance away from a high level of resilience.

### **2.1 The State of Community Public Space Use During the Epidemic**

The community public space mainly takes on the functions of material transportation and distribution, Covid-19 testing, and temporary tent construction during the quarantine period. However, the inherent backwardness of hardware conditions in old communities leads to ineffective epidemic prevention, such as inefficient resource allocation due to congested roads and a high risk of cross-infection in residents' lives. Moreover, most public facilities are single-functional and in poor condition, and lack of ecological environment such as green landscape space, making residents lose the desire to move around in public space. In addition, dirty and poor public hygiene conditions make it more difficult to eliminate viruses. At the same time, it is easy to breed other bacteria, viruses or harmful insects, which can damage the ecological environment of the community.

### **2.2 Resident Life Patterns and Mental Model States**

Due to the quarantine policy, residents' movement is restricted to the community, they rely on the Internet for work and education, and the lack of space in older communities to meet their spatial needs has resulted in widespread physical health problems due to lack of exercise and a significantly higher incidence of mental health than before the epidemic. The extended recurrence of the pandemic in Shanghai, accompanied by isolated breakouts and a great deal of incorrect information, caused inhabitants' emotions to fluctuate and made it easier for resentment to collect. Even in the post-epidemic period, it will take time for such emotions to heal.

### **2.3 The State of the Community Management Model**

To decrease the danger of viral transmission and secondary infection, the community rigorously regulates the flow of persons entering and exiting the gate, and all people and goods entering and exiting the community must pass covid-19 testing and virus disinfection.

Additionally, the community must manage the social distance between individuals and document its members' daily health conditions and test results. The low rents in remote and old communities have gathered many migrant workers. For this reason, the phenomenon of multiple households in one room is common, which makes it difficult to record information and distribute supplies to the residents. In addition, the ageing problem in older communities is serious, and emergency medical care, rigid medication dispensing, life care and other livelihood protection are restricted during the epidemic, thus affecting the health and safety of the elderly.

### **3 Strategies for Improving Public Space in Old Communities**

Based on the above analysis, it can be stated that the ancient difficulties of the existing old communities are incompatible with current public living circumstances and are incapable of protecting the inhabitants' health in the case of an epidemic. The renovation of public space should prioritize the dynamic living patterns of inhabitants in various circumstances and align space functions with the features of resilient communities. Therefore, the author recommends a " symbiosis station " strategy. " The " symbiosis station " is a service location that meets the needs of different groups of residents for living, socializing, and recreation in normal life, as well as the needs of community members for health, safety, and efficiency in episodic community quarantine, by transforming the functions of spaces or devices within the station, and must have the following three characteristics.

#### **3.1 Space Layout with Security and Openness**

Safety and transparency are the first fundamental components of a " symbiosis station" and the need to gain people's trust. Regarding space layout, it is vital to comply with public space construction rules and maintain an adequate buffer and transition space to guarantee that inhabitants may escape or receive aid in crises promptly and with appropriate space. There needs to be enough openness and inclusiveness in the visualization and usage of the space so that residents can easily understand the operation mode of the space and integrate quickly.

#### **3.2 Space Facilities with Multiple Attributes and Flexibility**

The premise of restricted public space necessitates facilities with composite multifunctional characteristics to meet the demands of inhabitants of all ages. The conditions of daily life and communal quarantine are radically dissimilar. When an incident happens, the community must quickly complete the strategic deployment of epidemic preventive measures. Therefore, public facilities should avoid functional homogeneity and be easily dismantled and reassembled to accommodate new applications.

#### **3.3 Usage Patterns with Participation and Cooperation**

By organizing participatory community activities, we create channels for different communities to communicate and express their perspectives, rationalize the use of space, build mutual trust through cooperation and mutual assistance, and reduce the negative emotions resulting from neighbourhood conflicts. During the duration of quarantine, the majority of inhabitants are anxious and despondent. Involving people in activities and works linked to epidemic prevention can decrease the burden on community personnel, alleviate the agony of residents at home under quarantine, and increase understanding of their psychological needs.

## 4 "Symbiosis Station" Design Research in Shanghai Hongqiao Airport New Village

### 4.1 Basic Information of New Village

The "Symbiosis Station" design firm is located in Hongqiao Airport New Village in Shanghai's Changning District, next to Shanghai Hongqiao International Airport. As the welfare housing of China Eastern Airlines, Shanghai Airport, and the Aviation Administration in the early years, Hongqiao Airport New Village is the home of the old generation of aviation people, carries many memories and stories and remains the place where a large number of aviation employees live and work. Hongqiao Airport New Village's culture has become even more diverse due to the gradual influx of inhabitants from various social backgrounds as Shanghai's economy has grown.

Hongqiao Airport New Village has a complete set of basic services. However, after questionnaires, interviews, and site visits, we found that with the development of the community and the movement of people, Hongqiao Airport New Village still has problems such as limited space, uneven distribution of resources, the gradual disappearance of community culture, serious xenophobia of residents, and conflicts caused by differences in residents' ideology. After consultation with the community council, we chose a site in the new village square and the surrounding unused space. The site is located in the centre of the new village, with the community council office to the north, the lotus pond park to the south, and the new village shopping street to the east, which has a high flow of people and is suitable as a practice site for the "Symbiosis Station".

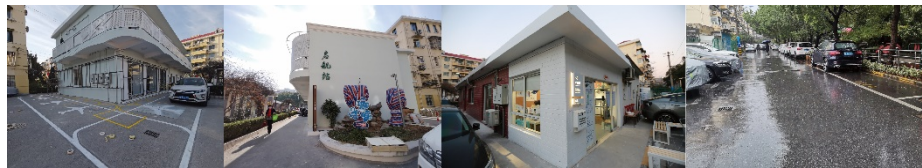


Figure 2: Original photos of the site

### 4.2 Requirement analysis of "Symbiosis Station"

To make the "symbiosis station" suitable for residents of all identities and ages, we divided the residents into elderly, tenants, parent-child families and community workers and selected one representative member from each of these four groups to analyze their behaviour patterns and preferences. This was used as a reference for the spatial function and route division of the "symbiosis station". The following are the results of the research on the four representatives.

Ms Wang represents young renters who have recently moved into the new community. This group is sociable, imaginative, interested in various topics, and privacy sensitive. However, they are often unfamiliar with the community and do not engage in or comprehend the group activities or resident meetings. Since there are no entertainment facilities or places for young people in the new hamlet, they do not spend a long time in public areas. Throughout the quarantine, she has been working from home.

Mr Chen currently works at Hongqiao Airport and has resided in New Village for several years. In New Village, he represents a parent-child family. This group has a strong emotional connection to the community, and their everyday behaviour in the community consists of accompanying their children to entertainment events and taking part in community activities. Current recommendations for the new village include enhancing environmental health, reviving its original aviation culture, and fostering positive relationships among various



community groups. Work was halted during the quarantine period so that he could spend more time with his family.

Mr Lin represents the first residents and is among those who moved in at the commencement of the new village's building. Due to the surge of new residents, many acquaintances and colleagues have departed the new village. This group of residents has become unknown and isolated due to the drastic changes. This group lived mostly in the new village and its neighbouring streets, and their daily interests and pastimes consisted primarily of sports, chess, and gardening. During the quarantine period, most information and messages were provided online. The inability of most elderly to operate cell phones made it difficult to adapt to life in quarantine.

Mr Wu represents the community workers who comprehend the new village's history, culture, and community relations. During the quarantine, he was largely responsible for providing supplies and doing covid-19 testing. In order to prevent cross-infection with residents, community workers were compelled to reside in community councils or other temporary facilities, which diminished the quality of life for many community workers. In addition, the dispersed storage sites and limited room for Covid-19 testing reduced their efficiency.

#### 4.3 Design Analysis of "Symbiosis Station"

As a consequence of the above analysis, the "symbiosis station" should serve as a venue for cultural and educational output and a location for inhabitants of all ages to mingle and enjoy themselves. During the quarantine period, it is necessary to change the function of the scene into a stockpile of epidemic prevention materials, information displays, covid-19 testing points and other disease consultation points. Therefore, a community museum, a 24-hour convenience store, a shared recreation room, a community plaza and a co-creation garden have been set up in the " symbiosis station" design. The aviation theme culture was first refined in the renovation, and the questionnaire survey and residents' participation workshop were conducted in "Your Heart's Airport New Village Public Space". Extract the keywords of "airplane", "runway", "blue" , "warm" and "open". Based on the above information, specific design analysis of these five places is carried out.



Figure 3: Axonometric view of Symbiosis Station

**Community Museum.** The community museum is a cultural and educational institution for children and adults. The rehabilitation of the community museum includes the renovation of the exterior, the design of the internal display, and the design of the outdoor activity space.

The renovation of the community museum is comprised of three distinct phases: façade renovation, interior display design, and outdoor activity area design. The outer facade is built with a slanted roof and parametric partitions to enhance the dynamic aesthetics of the building, followed by a blue-grey and white exterior color scheme. The museum's interior consists of a foyer, creative space, activity area, screening room, and temporary studio. Except for the creative space, the remaining space is flexible for future museum operations. The community council and residents contribute most of the exhibition's materials and displays. The outside space of the museum is outfitted with some movable trolleys for museum-themed programs and activities. During the quarantine period, the museum's interior can be converted into a storage space for materials, the facade display area can be used as a public display area for the epidemic, and the museum's outdoor space can be used for covid-19 inspection and registration.



Figure 4: Rendering of the community museum in usual life

**24-hour Convenience Store.** In addition to selling items and providing food, the 24-hour convenience shop offers spiritual solace for airport workers and other people who are off duty at night. Convenience shops may attract community members by offering the correct combination of food and subsidies for the elderly, therefore enhancing opportunities for intercommunity dialogue and community employment. Modular furniture that can be moved and quickly dismantled can be utilized to boost the flexibility and diversity of the space, such as dining tables and chairs that can be changed into beds and used as a community break room for out-stationed workers during community quarantine. Convenience shops can also provide healthy takeout options for employees and individuals without cooking equipment or abilities.



Figure 5: The rendering of 24-hour convenience store in usual life and during quarantine

**Shared Recreation Room.** Based on research into the interests of residents, the shared recreation rooms may serve as a movie screening room, a sports room, and a shared office to enhance the recreational life of residents. Due to the need to control the number of people and time of crowd gatherings during the quarantine period, these three spaces can be converted into medical consultation rooms, temporary patient observation rooms, and medical staff studios to ensure that residents receive prompt medical care in the event of sudden physical or mental illness.

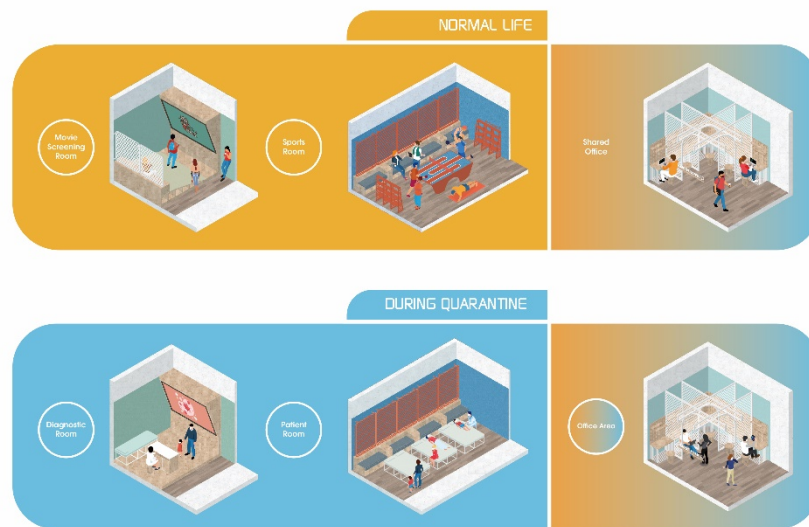


Figure 6: The rendering of shared recreation rooms in usual life and during quarantine

**Community Plaza.** The community plaza originally consisted of a simple lectern and a resting pavilion. Consequently, this makeover built one primary square and two minor squares based on the mobility and gathering spots of the people and distinguished them with distinct shades of blue plastic flooring. In addition, inhabitants can self-assemble a range of functional furniture, such as market booths, children's amusement facilities, and leisure chairs, to support a variety of thematic activities or everyday enjoyment. During the duration of quarantine, the modular modules can also serve as temporary covid-19 detection locations.



Figure 7: The rendering of community plaza in usual life and during quarantine

**Co-creation Garden.** The Co-Creation Garden is situated on the upper level of the communal recreation room, with a stairway separating the various planting spaces and aisles. Daily, the garden is available for individuals interested in growing vegetables or flowers and for youngsters to learn about plants and gardening. The benefits of this function include the formation of healthy farming products with community characteristics for self-production and self-marketing within and outside the community; the enhancement of the community ecological environment while promoting neighbourhood interaction and fostering a greater



sense of community identity and belonging; and food education that fosters children's responsibility to protect the environment and value food. During the quarantine period, the communal garden may replenish the community's food supply and guarantee that people have appropriate daily food reserves.



Figure 8: The rendering of Co-Creation Garden in usual life

## 5 Conclusion

Although the covid-19 epidemic is now sporadically breaking out in the country, it still affects people's daily behaviour and psychological and emotional well-being. As a mass gathering unit, the community must resist all kinds of social changes that are harmful to the healthy lives of the residents and guide them to grow together with mutual trust. As a practical example of promoting the development of human and environmental resilience in the context of reforming old communities in the post-epidemic era, the "Symbiosis Station" promotes the relationship between people, the environment and the environment by building different interactive places, adaptive facilities and participatory activities to meet the diverse needs of community residents and occasional major public health events. Ultimately, a set of community cultural environment optimization methods compatible with cultural atmosphere, innovative ideas, sentiment cohesion, tolerance, and openness are established to promote a sense of humanism and collaborative governance in community members and the general public.

## References

- [1] Chong Peng, Zuyuan Guo, Zhongren Peng. Progress in the theory and practice of community resilience from abroad [J]. Urban Planning International , 2017,32(04):60-66.
- [2] Fang Liu. Exploitation and utilization of social resources in community education development [D]. Shanghai Normal University, 2004.
- [3] Lihui Ding, Yujia Chang, Linjing Zhu, Yanan Feng. Analysis of urban safety and disaster mitigation based on the concept of resilient city [J]. Modern Property Management (Midterm Journal), 2019(03): 177. DOI:10.16141/j.cnki.1671-8089.2019.03.158
- [4] Qi Yang. Research on the impact of rural infrastructure development on rural residents' consumption [D]. Southwest University of Finance and Economics, 2011.
- [5] Yi Zhu, Yue Zhou, JiaChen Li, Jing Peng, Xiaoyi Xu. Study on public space design for resilient communities from a post-epidemic perspective: the case of Wuhan City Guanggu Youth City [J]. Urban Development Studies, 2022,29(05):59-67.

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