

# Study on the Optimization Design Strategy of Urban Fragmented Space From the Perspective of Architectural Typology

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**Abstract:** In the relational theories and researches, it is widely recognized that the urban space should be valued while the urban fragmented space, also as a part of the public space, which is closely and inseparably related to people's daily life, got very little attention in the process of rapid modernization. Such space is often ignored both by users and designers.

This paper takes the fragmented space in Shanghai as an example, applying the theory of architectural typology and urban morphology to define the urban fragmented space and analyse the formation cause, spatial forms and elements. Through the filed investigation and theory research, it concludes the existing problems of urban fragmented space such as the low spatial utilization efficiency, environmental pollution and poor spatial quality.

It proposes the optimization design strategy from the aspects of function definition, interface and detail design, scale control and the application of new technology. It hopes to have a positive effect on the design and development of the contemporary urban public space, improving the quality of urban space and providing a more comfortable and energetic space for citizens. This paper is subsidized by NSFC project which is named as <Research on Technical System of "Downtown Factory" Community-oriented Regeneration in Yangtze River Delta Region>, NO.51678412.

## 1. Introduction

The urban scattered space is an important part of the public space of modern cities. Chinese cities are still in the process of urbanization, and the scale of cities is expanding, resulting in a variety of urban scattered spaces. These spaces are created by the influence of history and nature factors. They are widely scattered in every corner of the city.

The scattered space of the city not only occupies more and more urban space, but also continues to affect the urban space invisibly. Based on the current situation of scattered space in Shanghai, this paper analyzes the causes, forms, and existing problems and proposes a design strategy for how to optimize the urban scattered space.

## 2. Methodology

### 2.1. *Theoretical research*

The author has studied and analyzed the existing literature and data. On this basis, the collection of data were carried out for specific problems.

### 2.2. *Practical research*

1) Observing and participating. Observation is the first step into the scattered space. The combination of theoretical research and practical research is the main research method in this paper.

2) Chatting and drawing. The spatial form and elements of the scattered space are different from the designed space. Whenever I saw a typical example of scattered space, I stopped and recording its shape.

## 3. Analysis/Results

In the city, some scattered space can be rationally developed and utilized by people, forming an active space that can satisfy people's needs and provide cheap and safe public facilities for the citizens. Some scattered spaces are disorderly, not properly utilized, and even lead to insecurity[1].

### 3.1. *Definition*

Then, the urban scattered space to be studied in this paper has the following basic features:

1. The scattered space is the outline of the shape without the boundary.
2. The scattered space is an unconcentrated space that has not been designed and used by the citizens.

### 3.2. *Causes of formation*

The process of urbanization produced some urban spatial functions. There will always be vacant and abandoned space. This is the cause of the formation of urban scattered space. Urban development pays more attention to the urban construction unit, and it is easy to ignore the relationship between the building and the surrounding space so that there will be scattered space between the buildings.

And due to natural causes, some special areas appear in the city, forming elevations, sloping fields, basins and rivers. Due to these inevitable natural factors, the city is cut into different interfaces, resulting in spatial faults.

### 3.3. *Spatial form*

Urban scattered space has various forms and varies widely in cities. Therefore, the study of urban fragmentation space based on the basic of theory of typology can also be classified from different angles according to different standards and methods:

### *Classified by use*

- Commercial scattered space: Commercial scattered space mainly refers to all kinds of street vendors . This kind of street trade stalls is a means of earning a living for some people in the society and outsiders in the city.
- Leisure scattered space: There is still a large proportion of people in modern cities who lack space suitable for their ideal activities. These people who have neglected their own needs will gather in other places, which, although the environment is simple, can meet the basic needs of daily activities.

### *Classification by location*

- Connection zone between buildings: The form of scattered space between buildings is expressed as a buffer between public buildings, between public buildings and private buildings, between private buildings and private buildings. Part of this space is rationally utilized as a supplement to urban greening and the basic functions of the city. However, a large part of it shows a negative side[2].
- Traffic attached space: The development of modern cities has led to new development in transportation facilities. However, there has also been a certain amount of urban scattered space around it. The surrounding space under the urban viaduct not only bears the traffic function, but some people at the bottom of the society make a living and live here. The existence of these spaces is used by people, reflecting the lack of public space in China.
- Urban waterfront space: Urban waterfront space is an important part of the city. Some of the people at the bottom of the society choose to build houses and live in places where the environment is quiet. Due to the low quality of these bottom-level personnel and the weak awareness of environmental protection, the accumulation of domestic garbage and pollution of water resources have brought certain potential hidden dangers to urban development.

### *Classification according to morphological type*

- Linear scattered space: Linear scattered space refers to a limited open space between narrow urban streets and buildings. The expansion of the linear scattered space is easily restricted, developed in depth.
- Triangular scattered space: This kind of space is a relatively regular triangular-like public open space formed by three straight lines. This type of space is less used by people. It is often used as a transition space, leisure space, or lawn.
- Quadrilateral scattered space: This type of space is a relatively regular quadrilateral-like public open space formed by four straight lines. Such spatial forms are most frequently found in urban forms, and are more easily organized into regular spatial forms.
- Circular scattered space: This kind of spatial boundary is a public open space formed by arcs. It is designed in combination with urban architecture and urban streets, and is often seen in the corners of streets and resident courtyard space[3].

### 3.4. Existing problems

- (1) Environmental pollution. In such an environment, the effects of atmospheric pollution and various harsh climates will inevitably have adverse effects on the health of residents. These harmful substances not only pollute the urban environment but also endanger public health.
- (2) Low utilization. Most of the scattered space is not well designed, and the accessibility is not strong. As time goes by, people will gradually forget the waste of urban space. This type of fragmented space is not attractive to public activities of urban residents.
- (3) Low space quality. Some of the spatial traits of the scattered space also provide opportunities for these criminals to escape from arrest. Such a region will give people a feeling of discomfort and insecurity. This vicious circle makes the negative side of the scattered space of the city more unattractive.

## 4. Discussion/Conclusion

### 4.1. Design strategy

- 1) Function optimization. Inject the corresponding functions into this type of space, and then design them after improvement. Only in this way can the actual meaning of reuse be generated. Scattered space is a special space with special qualities in the city. Its reuse is a more demanding goal to promote urban public life and improve environmental quality.
- 2) Improvement of the spatial interface. Make up the crippled spatial interface with a pleasant visual experience. All the elements that make up the scattered space of the city can be utilized and transformed to break the rigid spatial interface of the scattered space of the city and alleviate the depressed hearts of people in the busy city life.
- 3) Enhance spatial accessibility. In the design of the building, this part of the scattered space is used as an extension of the building to enhance its accessibility and give them some fuzzy functionality. For example, planting plants on a large concrete surface; using lighting, color, and texture to add architectural details.
- 4) Apply new technology. The development of science and technology has also provided fresh blood for the new development of the city. Space functions can no longer meet the new demands of the times, taking ECO Japan's new underground garage as an example. The design of the ECO bicycle garage utilizes the scattered space in the city to improve the chaotic street traffic in the city and saves a lot of space on the ground.

And the limited urban space does not leave too much available urban space for our new world, so the undesigned or forgotten urban scattered space in these cities provides new development for the city. As designers, we have the responsibility to reinterpret these potential space, improve urban land use and achieve a good and recyclable development of the city.

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