Research on Sustainable Development of Historical and Cultural District in Tunxi Old Street of Huangshan with Micro-Regeneration Concept

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Abstract: As the most influential commercial port center of ancient Huizhou, Tunxi Old Street is an important material carrier of Hui culture. In the current optimization of urban stock, it is faced with problems such as the decline of regional culture and the homogeneity of spatial form. By combing the historical evolution and value characteristics of Tunxi Old Street, introducing the concept of micro-regeneration, exploring the strategy of micro-regeneration of historical and cultural districts, this paper realizes the sustainable development of district from three dimensions of urban venation restoration, node space activation and building characteristics shaping, which can provide reference for the regeneration of other historical and cultural districts.

1 Introduction

As the key level of the protection system of famous cities in China, historical and cultural districts are a special type of heritage with dynamic characteristics, which belong to the category of typical living heritage. Protection and development are propositions of equal significance.^[1] In recent years, the protection and regeneration activities of architectural scholars on historical and cultural districts have changed from a static mode focusing on heritage protection to a dynamic mode oriented by cultural inheritance, from relative single space optimization to environmental protection, economic increasement, memory retention and other multiple value goals expansion, and have made many efforts for the protection and utilization of cultural heritage.^[2]

In recent years, Huangshan has initiated the preparation of the protection plan for the historical and cultural district of Tunxi Old Street, the environmental improvement of the block along the river, and the digital protection of regional ancient buildings. It has actively explored the optimization of the overall space environment and the conservation of regional traditional culture. As for the micro-built environment, it is not enough to research on the suitability update of the district with the technical means of micro-intervention and micro-impact, facing problems such as the disappearance of regional culture, the fracture of urban texture, and the decline of spatial vitality, which seriously affect the inheritance of historical features and local characteristics. It is urgent to find an effective path which is compatible with the sustainable development of

the district. This paper takes the micro-regeneration of Tunxi Old Street as an empirical study, exploring the development and advancement of the current historical and cultural districts from the three dimensions of urban texture, node space, and architectural characteristics, with the aim of which providing reference for the regeneration of other districts.

2 The development process and realistic dilemma of Tunxi Old Street

2.1 Historic evolution

As shown in Figure 1, Tunxi Old Street is located in Tunxi District, Huangshan, with Huashan Mountain in the north, Xin'an River in the south, and the intersection of Hengjiang and Shuaishui. The district originated in the Southern Song Dynasty with a history of more than 500 years. During the Ming and Qing Dynasties, Tunxi Old Street became an important economic center of Huizhou due to the concentration of commerce and handicrafts, reflecting the architectural culture and community life of Huizhou. Although the district has experienced vicissitudes in early modern times, the living environment and the business functions have declined, the overall spatial pattern and district style have been preserved. After the founding of the People's Republic of China, Tunxi Old Street has undergone four protection plans. The space environment of the district has been greatly improved, with better protecting of the authenticity and integrity. At the same time, it is appeared on problems such as single landscape interface,

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insufficient open space and decline in regional culture, hindering the sustainable development of the district.

The current district consists of one straight street, three vertical streets and 18 alleys, covering an area of about 20 hectares. The main street is more than 1,200 meters in length and 5 to 8 meters in width. It is wide in the east and narrow in the west, forming a fish skeleton as a whole. There are more than 300 buildings of various types, rich in cultural relics, and most of the buildings on both sides of the main street are two-story, partially three-story, with brick-wood mixed structures. Most of the architectural functions are commerce, residence, and office, which roughly form the architectural layout of the front shop and the back building, and the front shop and the back residence.

Figure 1. Location map

2.2 Value characteristics

2.2.1 Rich historical sites and integral spatial pattern

As shown in Figure 2, Tunxi Old Street has a large number of historical relics with various types, reserving many cultural protected and immovable cultural relics. The layout of the building is adapted to local conditions, compact and intensive in the land, complete and unified in the style. It is a typical sample of Huizhou's historical and cultural districts, reflecting the grand occasion of cultural exchanges. The district has the features of a fishbone-like waterfront spatial pattern with three verticals, three horizontals and dense lanes, showing a growth sequence from south to north and west to east. The terrain is close to mountains and rivers, and topographical conditions are fully utilized, reflecting the layout characteristics of flood prevention and safety-oriented.

Figure 2. Architectural heritage

2.2.2 Dependent on mountains and rivers, contrast with humanity and history

From the perspective of the overall urban environment, Tunxi Old Street has the features of mountain and water interdependence and three parallel rivers, forming a trend of surrounding mountains and water. In the long historical process, the district retains many urban elements, such as the remains of Daizhen Park, Yanghuzhou Greenland, Zhutang Lake, etc., reflecting the organic integration of community life and natural ecology. On the other hand, the people of ancient Huizhou created an urban picture scroll with Hui style under the unique natural landscape of Tunxi Old Street. A large number of literati rushed to chase, leaving many popular and poetic literary works.

2.2.3 The rise of civilization and the symbiosis of urban settlements

Tunxi Old Street is connected with Liyang and Yanghu through ancient roads such as ferry crossings and bridges, forming a group of urban settlements at the intersection of the three rivers, with typical endogenous features. Since early modern times, the commodity economy of Tunxi Old Street has developed further, with numerous public service facilities, and industrial relics such as handicraft workshops, shipyards and grain depots, which have witnessed the development process and achievements of modern industrial civilization in Huizhou. At the same time, the spread of Catholicism in Huizhou prompted the construction of the Huashan Catholic Church in Tunxi, which is an important product of the localization of foreign cultures.

2.3 Development dilemma

2.3.1 Single protection

At present, Tunxi Old Street only protects and utilizes the historical relics along the main street and the three longitudinal streets, mainly for commercial and cultural tourism functions, but there are still a large number of historical and cultural resources that have not been

rationally used, resulting in idle and dilapidated resources. The interconnection is weak, the function complex degree is low, and the traditional spatial interaction of three verticals and three horizontals and forested lanes is relatively insufficient in the district, which is difficult to show the profound historical and cultural connotation of Tunxi Old Street. Besides, the three major areas of Tunxi Old Street, Liyang and Yanghu developed independently, have not yet formed a development situation of mutual cooperation and harmonious coexistence. It is urgent to further tap the value potential and form a complete urban ecosystem.

2.3.2 Insufficient space quality

In recent years, it is obvious with the environmental improvement effect of Tunxi Old Street, but lacking the public space. There are only linear commercial streets, lacking green space, leisure squares, waterfront terraces and other spatial elements, which results in short rest periods for local residents and foreign tourists. The surrounding high-quality landscape has not been effectively displayed, especially the riverside plot and Huashan Park on the north side, which is an urgent need to increase public open space. In addition, as shown in Figure 3, there exists problems such as inconvenience of dynamic and static traffic, illegal construction of buildings (structures), insufficient public service facilities and single business functions, which have seriously affected the quality of residents' living and the inheritance of cultural heritage.

Figure 3. Insufficient space quality

2.3.3 Declining in intangible cultural heritage

As an important display window of Huizhou traditional culture, Tunxi Old Street has lost its own characteristics driven by commercial economy. There are few traditional cultural landscape images, insufficient cultural atmosphere, and relatively poor sense of identity and experience of local culture. Due to the lack of integrated planning and guidance of intangible cultural heritage, the living display of traditional culture is relatively simple, such as the historical and cultural landscape of "Tunpu Guifan" no longer exists; traditional skills, fine arts and folk activities are gradually disappearing in the process of urban modernization, facing the development dilemma of unsustainable.

3 Strategies and methods based on micro-regeneration

3.1 The connotation of micro-regeneration

The concept of micro-regeneration is developed based on the organic regeneration theory of Wu Liangyong. It abandons the traditional mode of large-scale demolition and construction, advocating the gradual regeneration of micro enterprises to realize urban regeneration. Li Yanbo thinks that "micro-regeneration" is a response to the current urban development, and has made a lot of inspiration to practice, society and humanity in the field of orthodox architecture.^[3] Ye Lu combed the development process and cultural features based on the case study of the micro-regeneration of the Three-Camp Land Parcel in Laomendong, has realized the regeneration of the vitality of Laomendong from three aspects: district texture restoration, morphological reconstruction and function replacement.^[4] Cai Yongjie summed up the theory and practice of urban micro-regeneration in the west, criticized the modernist urban transformation, stressed that urban construction should pay attention to the needs of people, advocating the use of small and medium-sized, functional and step-by-step transformation. He observed that small projects have a positive effect on urban rejuvenation, and advocated the use of recognizable urban spaces to restore the traditional urban form so as to make up for fragments and lost buildings, believing that "piece-by-piece" and "plug-in" can gradually improve the quality of the urban environment.^[5]

As shown in Figure 4, micro-regeneration is a reflection on the pursuit of grand scenes as a single value orientation in the current rapid urbanization process. It pays more attention to concrete and subtle narratives of civilians, and has a more microscopic perspective, such as courtyard improvement, building interface optimization, public facilities improvement, etc. It respects the inherent rules of urban development, while improving the quality of the existing environment, it continues the urban context, retains collective memory, demonstrates the locality of the architectural space, and properly handles the duality of tradition and modernity, protection and development, acting an important practical significance for the improvement of urban material environment and the inheritance of regional culture.

Concept connotation	Typical characteristic	Operating method	Participant subject
Organic renewal	Venation repair	Dig the potential	Resident
Micro renovation	Catalyst interconnect	Darning	Designer
Micro intervention	Internal-external interconnect	Implant	Firm
Urban governance	Sustainability	Suture	Government

Figure 4. The concept of micro-regeneration

3.2 Micro-regeneration strategy of historical and cultural districts

3.2.1 Venation restoration—Optimize the urban spatial context

Urban texture is the material representation of the layering of urban spatial elements in different periods. It is the continuous precipitation of historical information, maintaining the overall spatial structure of the districts, which is dynamic and organic. Therefore, in the micro-regeneration of historical and cultural districts, we should focus on sorting out its development context, digging out various material and non-material elements, decomposing heterogeneous constructions that conflict with the overall style of the block, and restoring a clear district texture relationship, reshaping the complete district space network and rich historical resources, fully demonstrating the era and locality of the district micro-regeneration. At the same time, in order to meet the necessary living needs of local residents, we need to use bottom-up technical means to implant appropriate spatial organization, effectively darn things such as district static traffic, shared courtyards and life services, so as to gain the recognition of local residents.

3.2.2 Interconnect catalyst—Stimulate the vitality of the node space

Due to historical and cultural districts are relatively complex urban ecosystems, micro-regeneration activities need to select important spatial nodes to operate, forming a catalyst linkage effect. Firstly, the node space value is judged based on the features of the resource endowment in the district, and the small and micro progressive update mode is implemented for the node plots with the most regeneration potential. Secondly, opportunity nodes should be selected to carry out catalyst linkage. The choice of catalyst nodes must firstly integrate existing space resources, optimize the spatial quality of the district, and enhance the overall image of the district; secondly, related catalyst nodes should be linked to each other to play a leading and activating role with being typical and recognizable; thirdly, the historical context of the district should be paid attention, continuing the original spatial pattern, digging out the human history and customs contained in the material representation, and leaving room for independent updates in the future. The growth path for the integration of historical resources can be formed through the internal and external linkage of the catalyst node, which stimulates the vitality of the district space.

3.2.3 Function regeneration—Reshape architectural space characteristics

Facing the increasingly diverse value orientation of society, traditional district functions no longer satisfy a single supply-demand relationship, and more consideration is given to complex functional arrangements. The concept of micro-regeneration focuses on the inclusiveness and diversity of district functions, which pays attention to the mining of small and medium-sized functional formats and cultural resources. Through the collection and value judgment of the basic information for the buildings in the district, the buildings can be divided into different types, strictly

protecting the style of historical buildings, ensuring the authenticity of historical information, and demolishing illegal structures. Besides, it is necessary to use modern technology to complete the space refurbishment, incorporate functional formats that are compatible with modern lifestyles, and reshape the district space with distinctive regional characteristics.

4 Exploration of the micro-regeneration strategy in Tunxi Old Street

Based on the perspective of micro-regeneration, Tunxi Old Street fully excavates historical and cultural resources, integrates functions, culture, landscape, transportation and other urban substrates to form a clear urban spatial context; Combining the characteristics of the district and the actual needs, it needs to carry out the activation of catalyst nodes to drive the vitality of the surrounding district space, preserve the architectural cultural features, highlight the theme of Hui culture and adopt differentiated renewal methods for different types, so as to try to achieve a gradual and orderly integration city fragment shown in Figure 5.

Figure 5. The strategy framework of Tunxi old street micro-renewal

4.1 Repair urban venation

By digging the invisible context of the regional connection, district development and historical culture of Tunxi Old Street, it analyzes the internal mechanism and motivation in the obvious spatial pattern of the district, so as to fully reproduce the true historical context with profound cultural background. Cultural display lines should be condensed with different themes combined with the “Hui culture” resources and potential plots. For example, based on the functional base, Yima Road, Erma Road, and Sanma Road can be respectively formed leisure areas with the theme of “Huiwen”, “Huiyi”, and “Huiwei”; Huanchun Lane, Yongxin Lane and Yuchi Lane can be developed for different space themes; Fenglin Lane, Qingqing Lane, and Qihong Lane feature can be formed landscape image culture. On this basis, linear spaces can be used to expand the cultural context of the district, forming a cultural display line with one street and one theme and the in-depth experience of the cultural space is enhanced, which is both dynamic and static, elegant and popular.

Based on the original fishbone-like spatial structure and cultural resource features, it needs to strengthen the integration of the district with Huashan, Xin'anjiang and other urban resources to form a "three vertical, three horizontal, and four points" functional structure, so as to achieve internal and external linkage, and vertical coordination. As a result, the organic connection of Liyang, Yangcheng Lake area and Tunxi Old Street can be formed as a whole of Sanjiang and Sanan. "Three verticals" means that landscape resources of Huashan, Guanyin Mountain, Zhutang Mountain and Xin'an River can be connected through three north-south functional axes, forming a landscape functional corridor of "mountain-street-river". "Three horizontals" means that three east-west traffic arteries have formed a distinct spatial area. Yan'an Road in the north is the living service axis, providing convenient services, Old Street in the middle is the traditional commercial axis, focusing on the display of Hui culture, and Binjiang Road in the south is leisure cultural axis, using the riverside space to create a well visual landscape. The "four points" are the east-west entrances of the old street, containing four main landscape nodes which are formed in the intersections of Sanma Road, Yan'an Road and Binjiang Road form.

In terms of landscape venation, it needs to sort out the existing alley space, pocket parks, green courtyards, waterfront space, etc., connect various landscape nodes, forming a "three horizontal, three vertical, multiple corridors, and multiple corridors" landscape structure. Secondly, relying on the existing spatial pattern of the district, it strictly needs to control the buildings' height, open up the landmark landscape nodes and the landscape corridors, so as to restore the traditional landscape image in the historical period. Finally, the historical landscape of Tunpu Guifan can be reshaped by micro-renewal activities such as the removal of illegal structures, replacement of paving, and addition of activity squares shown in Figure 6.

Figure 6. Block functional structure

4.2 Activate node space

Based on the analysis of the district venation and the current resource mining, it needs to select the opportunity plots from the perspectives of culture, life, industry, etc.,

carry out the catalyst node planning based on the features of the plots, the current spatial situation and the needs of citizens, so as to realize the spatial effect of the catalyst linkage, activating the field of the surrounding district space. For example, on the Binjiang Road block, using the methods of retaining important historical environmental elements, combing the spatial texture of lanes, and restoring the "He Street", the commercial prosperity and the image of Tunpu Guifan can be reshaped as shown in Figure 7.

Among them, block A is located at the entrance of the northwest corner of the He Street. The design technique preserves the spatial elements of historical buildings and slightly improves the architectural interface, and arranges leisure corridors in the waterfront area to form the space penetration relationship of "street-corridor-water". At the same time, combined with the function of preserved buildings along the street, the outdoor venue can be set in the front of the buildings to activate the vitality of the lane effectively. Block B is laid out in the form of enclosed groups, separated by walls, corridors and the He Street, forming a pattern of "separated but not enclosed, enclosed but not enclosed". Besides, the internal space of the group is organized by patio, reproducing the scene of the patio space in Huizhou buildings shown in Figure 8. Because of the strong family ethics in ancient Huizhou, the word "万" was extracted from "Home and Everything" in the design of block C, creating four exhibition halls: "Three Sculptures" Exhibition, Four Treasures Exhibition, Folk Customs Exhibition and Huizhou Architectural Models Exhibition. In order to obtain a wide view, the building interface along the river can be virtualized partially, connecting the east and west plots effectively. Block D is located at the eastern of He Street. In order to change the existing impression of urban living room, it needs to focus on the shape of the riverside interface and lane interface, giving play to the historical value of Tunxi Old Street as a traditional commercial and cultural experience area.

Figure 7. Riverside Road block master plan

Figure 8. Node design of block C

4.3 Repair urban venation

Diversified micro-renewal strategies are proposed according to the characteristics of the current buildings in the block, which can be divided into protection, improvement and renovation. In order to continue the original architectural style, the “repair as old” method can be adopted for the building of cultural relics protection units at all levels, historical buildings, etc. The selection of materials, color matching, etc. should echo the surrounding environment, introducing functional formats which is compatible for the block industries positioning. For example, the South Anhui Special Committee of the Communist Party of China can be used as a memorial space. Yongxin Alley 8 can be renovated and implanted in the courtyard space to create a featured homestay. As for buildings with a low utilization rate in the block, some second-floor space of traditional shops can be replaced with public space such

as exhibitions and publicity by excavating the original building features, replacing the negative space, incorporating facilities suitable for modern life. For example, No. 188 is a two-story, three-entry wooden structure, the first two spaces are shops and the last one is a warehouse. In order to form a progressive spatial penetration, the three-entry space is opened up. The second-floor space is renovated into a tea room, forming a leisure space suitable for movement and static. In addition, due to the existing of

Fig.9 Renewal design of Fishbone Lane 2

some buildings which is conflict with the traditional style in terms of volume, color, etc., it needs to reset the shape of the buildings, integrate architectural language suitable for the block depend on the overall spatial texture of the block and the needs of residents, so as to realize the organic growth of the block. Besides, Fishbone Lane 2 is huge in size, which is inconsistent with the traditional architecture style, hindering the visual transparency of the streets. So, as shown in Figure 9, the building interface along Binjiang Road in the Fishbone Lane area can be expanded, and tourism service, exhibition, commercial and other spaces can be implanted in the updating, creating an effective connection between waterfront space and street space.

5 Conclusion

As the important parts of the city organic development, historical and cultural districts are faced with multiple contradictions between protection and development, as well as the present and the future on account of the particularity of heritage activation. Therefore, it is urgent to explore suitable renewal models and methods. Based on the concept of micro-renewal, this paper realizes the regeneration of the district from three aspects of district venation, node space and architectural features, providing reference for the implementation of similar historical and cultural districts.

Acknowledgments

This paper is funded by the following projects:

1. Research on the Reuse Strategy of Modern Industrial Buildings Alongside Jinpu Railway in Anhui Based on the Theory of “Double Urban Repairs” (2018QD19)

2. 2020 Academic Subsidy Project for top-notch academic talents in Universities - Zhang Xiaoxiao(gxyq2020035)

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