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Exploration of Renewal and Renovation Design of Historical and Cultural Protection Areas Based on Smart Cities

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Abstract: Historical and cultural protected areas are not only the continuation of urban context, but also an important link for modern cities to harmoniously coexist with ancient traditions. On the basis of protecting historical blocks, this article proposes to integrate the concept of smart cities into the renewal and renovation of historical protection blocks. After comprehensively analyzing the problems faced by the renewal and renovation of historical protected blocks, a renovation strategy combining the concept of smart cities with unique historical blocks is proposed to redesign and plan the area, aiming to preserve the historical style while creating a new type of space that conforms to urban development and modern living needs.

1. Introduction

With the continuous advancement of urbanization in our country and the continuous construction of high-rise buildings, the issue of updating and renovating historical and cultural protected areas in cities is gradually becoming prominent. However, in most historical environments in China, there are overall problems such as chaotic functional structures, aging facilities, declining buildings, population loss, and declining community activities in the neighborhoods. The revitalization and enrichment of the functions and spaces of neighborhoods have naturally become an important part of the renovation and renovation of neighborhoods[1].

With the continuous development of modern science and technology, the concept of smart cities has emerged. Smart cities have become the main direction for the future development of cities with the trend of modernization, technology, and convenience. Therefore, proposing the concept of smart cities to update and transform historical and cultural protected areas is beneficial for keeping up with the times and adapting to urban development.

2. Research background

In the context of rapid urban development today, the renovation and renovation of historical protected blocks in urban renewal has become a major challenge. On the one hand, the development of cities has brought about the demand for economic growth and modernization construction. On the other hand, historical protection blocks carry the memory and cultural heritage of the city, and have

irreplaceable value. As an important carrier of urban historical and cultural heritage, historic districts face a series of problems such as aging population, aging public facilities, and traffic congestion. These issues have affected the living environment of residents in the neighborhood and also affected the city's image. With the proposal of the concept of smart cities, various regions are implementing and continuously optimizing smart cities. Taking into account, the concept of smart cities can be combined with the renewal and renovation of historical protected blocks to become a special historical landscape area of smart cities.

3. Smart Cities

3.1. Smart City Concept

Smart city is a new concept and model that deeply integrates the new generation of information and communication technology with urban economic and social development, promoting the intelligence of urban planning, construction, management, and services. It is also a new form of city that maps and cooperates with the physical world and the digital world[2].

3.2. Characteristics of Smart Cities

Smart cities rely on technologies such as spatiotemporal big data, cloud computing, and the Internet of Things, aiming to integrate various systems of urban life, with a focus on building a unified digital platform for intelligent management. The new smart city combines digital twin, blockchain, metaverse and other technologies to integrate the entire city, and adopts intelligent life forms based on artificial intelligence for decision-making, integrating real and virtual elements to achieve advanced urban management[3]. Smart cities enhance timely feedback on urban demand, public services, etc. through real-time monitoring and analysis of cities, emphasizing the use of advanced information technology and intelligent means to improve the operational efficiency and management level of cities, while emphasizing people-oriented, sustainable development, and innovation driven. In this context, introducing the concept of smart cities into the renewal and renovation of historical protection blocks can not only better protect and inherit historical and cultural heritage, but also enhance the vitality and competitiveness of the blocks, and achieve sustainable development of the city.

4. Historical and Cultural Protection Areas

4.1. Current situation of historical and cultural protected areas

Historical and cultural protected areas refer to blocks with certain historical and cultural value and traditional architectural style, which are important components of urban history and culture. The rapid development of cities may lead to the danger of demolition and destruction of historical neighborhoods, and the balance between protection and utilization also needs to be handled with caution to avoid excessive commercialization or loss of original historical characteristics. Many cities recognize the importance of historical neighborhoods and have taken a series of protection and utilization measures to achieve sustainable development of historical neighborhoods. Different cities have adopted diverse protection methods. Some cities pay attention to preserving the original style of historical buildings and carry out "restoration as before"; Other cities use scene reconstruction to interpret historical elements in a contemporary way to meet the needs of modern society.

4.2. Value of Historical and Cultural Protection Areas

Historical and cultural protected areas are witnesses of history, carrying information from various social, political, economic, cultural and other aspects of the past. Through architecture, street layout, cultural relics, etc., they showcase the development context and evolution of the city. These historical information play an irreplaceable role in studying history, understanding past social forms, and people's lifestyles. By studying and researching historical and cultural protected areas, we can gain a deeper understanding of our country and ethnic history, cultivate historical awareness and cultural literacy, enhance national pride and patriotism, and provide rich and authentic materials for academic research by scholars. At the same time, historical and cultural protected areas attract a large number of tourists to come for sightseeing, driving the development of local tourism industry and bringing considerable economic benefits to the city.

5. Research Objectives

In the wave of globalization and informatization, the concept of smart cities has emerged. It is not only a manifestation of technological progress, but also a new direction for sustainable urban development. This article aims to explore the potential application of smart cities in urban renewal and renovation, as well as how to achieve effective protection and rational utilization of historical and cultural heritage through technological means. By combining the unique charm of historical districts with modern intelligent technology, innovative vitality will be stimulated, revitalizing historical protected districts while maintaining their profound cultural heritage and historical value. The purpose of this study is divided into the following two points.

(1) As far as the smart city itself is concerned, exploring the development concept, characteristics, and key role of smart cities in the transformation and upgrading process of historical protection blocks. Smart cities are not just the accumulation of technology, but a systematic solution that integrates intelligent technology into urban planning, construction, and management to improve the quality of life of residents and promote comprehensive economic and social development.

(2) Conduct an in-depth analysis of the renewal and renovation issues of historical protected blocks, including the challenges currently faced by these areas, such as aging buildings, single functionality, and environmental degradation. Under the premise of discussing how to preserve the historical style, we will implement renovation and renovation by leveraging advanced technologies and management models of smart cities. For example, by introducing intelligent facilities, the safety and convenience of the neighborhood can be improved; Alternatively, through data analysis, more precise maintenance and usage recommendations can be provided for historical buildings.

6. Transformation Strategy

The implementation of historical and cultural protection under the concept of smart cities is divided into three aspects. Firstly, for the buildings in the historical protection area, it advocates restoration rather than demolition. At the same time, a professional restoration team is organized to use the original materials and techniques of the building to repair a small part of the damaged buildings, ensuring that the building retains its original historical style and structural integrity. For buildings that are severely damaged or cannot be restored, the concept of smart cities is adopted. By establishing an online platform, historical data is digitized and implanted into the platform or app. With the help of virtual imaging technology, holographic restoration of historical and cultural protection areas is carried out, allowing tourists and researchers to experience the complete appearance of historical and cultural protection areas firsthand, enhancing the historical value of the area. Secondly, the transformation of infrastructure in the protected areas can be achieved through

information integration technologies such as the Internet of Things, cloud computing, and big data, making urban services and management automated and intelligent. At the same time, improving the utilization of urban resources can provide citizens with more efficient and humane services[4]. Intelligent energy management systems can also be used to optimize energy consumption and reduce environmental impact. In addition, smart systems respond to the needs of tourists and citizens in a timely manner through big data analysis, provide personalized services, and enhance the future development of protected areas.

7. Design Applications - Taking the Renewal and Renovation Design of the Honglou Area in Tiedong District, Anshan City as an Example

7.1. Location Analysis

The project is located in the Donghonglou Community and Xihonglou Community of Dagushan Street Office in Tiedong District, Anshan City, Liaoning Province. It includes Tiebei East Street and Tiebei West Street, south of the South Third Ring Road. The area includes the historical and cultural protection block of Anshan City - Honglou, named after its red appearance. There are a total of 21 residential buildings built by Ansteel for the employees of Dagushan Mine, also known as "Dagushan Honglou". The reason for choosing this location is because the Red Tower is an important protected area in the history of Anshan. The Red Tower was built according to the design drawings of the former Soviet Union. This building was built in 1953 during the Japanese invasion of China, according to the Soviet Union's design blueprint, and has certain historical significance. For Anshan, a city known for its steel industry, it is not just a building, but also a witness to a period of history.

7.2. Current Location Status

The coexistence of urban and mining resources within the area results in a high correlation between the spatial structure of mining cities and the development of industrial structure, population structure, ecological structure, road structure, etc., with low compactness and a dispersed distribution. There are residential areas for miners, mining railways, abandoned mines, etc. around the iron ore mine, and the boundaries tend to be complex. The newly built Dongze Capital building complex has a more rigorous layout, but there are few public areas and a lack of core landscapes such as water features and gardens. There are problems such as traffic congestion and insufficient parking lots in the core transportation area; The functions of the area are mixed, and the land use function is unclear, often with mixed traffic of people and vehicles. The area is all open communities without gates or fences, allowing pedestrians to pass through freely. The public facilities are aging and basically unoccupied, with fewer young people, mainly middle-aged and elderly people, mostly inhabited by miners.

7.3. Renovation measures

7.3.1. Traffic optimization

Optimize the roads in the Honglou area and set up centralized parking lots in the area. The most direct way to solve parking difficulties is to build more parking lots, but the resources available for building parking lots in cities are limited. However, from the perspective of a smart city, the parking lot, parking guidance system, and parking lot management system are effectively integrated with advanced technologies such as communication, computer, sensing, and control to establish a real-time, accurate, and efficient digital, networked, and intelligent comprehensive parking guidance and management system on a large scale in the city[5]. The smart city system is connected to online

platforms in real-time to display parking conditions in the area, facilitating the travel of citizens and tourists.

7.3.2. Optimization of spatial structure in the area

Taking the Red Chamber Historical and Cultural Protection Area as the core, carry out spatial optimization and restructuring, and re plan the spatial functional layout. Relocate the scattered factories and concentrate on planning them in the southwest industrial park. By connecting the spatial structure and based on the original characteristics of different areas within the area, a series of spatial structures will be formed, including the Red Building Historical and Cultural Protection Area - Red Building Cultural Exhibition Hall Group - Red Building Square - Red Building Tower - Red Building Commercial Complex - Characteristic Homestay Group - Industrial Park - Riverside Landscape Belt, to create a "smart town" and form a smart cultural and tourism integration through the application of modern science and technology.

7.3.3. Site Landscape Optimization

In order to optimize the ecological landscape of Honglou Historical and cultural Protection area, it is possible to establish an intelligent public facility system, transform public activity Spaces such as squares with intelligent facilities such as mutual sign system, multi-functional energy-saving system, sponge city ecosystem, intelligent climate regulation lighting fixtures, and install intelligent navigation systems on streets, rivers, and roads.At the same time, multifunctional AI interactive display screens are installed at landscape nodes, combined with online platforms to increase virtual experience services.

8. Conclusion

Historical and cultural protection areas are an indispensable and important component of urban development. Protecting and utilizing historical protected areas has profound significance for promoting sustainable urban development, inheriting human civilization, and promoting social progress. The content of this article is an exploration of the combination of the concept of smart cities and the renovation of historical and cultural protected areas, by integrating advanced technologies and renovation strategies from smart cities into the renovation of historical and cultural protected areas. It can maintain the historical charm of the city while meeting the needs of modern life. Through this combination, every historic preservation block can become a bridge connecting the past and future, inheritance and innovation.

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