Study on Sustainable Urban Planning and Design of High-Density Cities and Green Buildings from the Perspective of Carbon Neutralization Policy-Taking Shenzhen as an Example

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Abstract: With the continuous progress of society, the urban population has greatly increased, and there is a new demand for buildings. The role played by cities in economic development is becoming more and more obvious. The implementation of urban green building planning and design can improve the city image and improve people's living environment. City is the symbol of modern civilization, and it is an important space and action unit to promote the transformation of low-carbon economy and high-quality economic and social development. Although incorporating green buildings into urban planning is of various meanings, which is helpful to improve the protection ability of urban buildings, there are also some phenomena, such as paying attention to design image but neglecting practicality, and the imbalance between commercial value and ecological value. Taking Shenzhen as an example, this paper analyzes the significance of integrating green buildings into urban sustainable planning from the perspective of carbon-neutral policy, considers the problems in urban green building planning and design, and puts forward the ways to improve the design quality when the city realizes green planning and construction.

1. Introduction

In recent years, in the process of active and comprehensive construction, China has put forward the concept of new rural construction and the policy of urbanization construction, and the construction industry has ushered in a broad development space [1]. However, in this process, China presents the defects of large resource consumption and low engineering efficiency. The main reason for this phenomenon is the low resource utilization rate. At the same time, in the process of construction, the importance of ecological and environmental protection is seriously ignored [2]. Urban construction has a positive impact on social and economic development and has made good achievements, which needs to be analyzed. Influenced by factors such as sustainable development and ecological construction, in the process of architectural design, not only economic factors but

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also ecological value are considered, and a variety of architectural technologies and materials are applied to design and construction [3]. In the construction process of urban buildings, it mainly includes planning and design, construction, operation and maintenance and so on. Among these links, the most important is planning and design. Although it does not need to consume too many resources in the planning and design process, it determines the resources consumed in the whole building life cycle and its impact on the environment [4].

With the continuous evolution of the times, the pace of modern urban construction is accelerating, and more attention is paid to the sustainable development of the city [5]. This puts forward new requirements for the overall urban planning and design. New requirements must deal with the relationship between the city and the natural environment, so as to realize the harmonious coexistence between man and nature. In the current urban construction planning and design, scientific and rational design should be carried out, so as to better meet the needs of the new situation [6]. The implementation of urban green building planning and design can better enhance the city image and improve people's living environment [7]. City is the symbol of modern civilization and an important space and action unit to promote the transformation of low-carbon economy and high-quality economic and social development. In the process of urban development and construction, we must do a good job in the planning and design of green buildings to ensure the sustainable development of the city [8]. Based on this, taking Shenzhen as an example, this paper analyzes the significance of integrating green buildings into urban planning from the perspective of carbon-neutral policy, considers the problems in urban sustainable planning and design, and puts forward the ways to improve the design quality when the city realizes green planning and construction.

2. The Importance of Urban Green Building Planning and Design

2.1 Improve Urban Space Utilization

It is of many meanings to integrate green buildings into urban planning. First, it can actively improve the traditional urban architectural model and enhance the quality of urban architecture. Thinking about the previous urban development, we can find that the rapid construction and development of these cities is based on the high consumption of resources. Green building is the concept of advocating low carbon and environmental protection, which embodies the three characteristics of the circulation system. First, it can make resources realize reasonable circulation; second, it can make industries optimize circulation; third, it can make spiritual culture circulate effectively. Since the establishment of Shenzhen Special Economic Zone, the population growth rate of Shenzhen has always been the highest in the country, and it has significant characteristics in population composition, that is, 60% of the total population of the city is foreign temporary residents. This part of the migrant population is different from the floating population in the general sense. They have great stability in their work and life style. Therefore, they have similar needs for the social supply system with the permanent population. When carrying out urban planning and design, we should fully consider the regional characteristics of the city and fully integrate it in urban construction planning. Only in this way can the planning and design of urban green buildings have strong urban regional characteristics. In the wave of economic development, the scale of cities has expanded greatly, and a large number of rural people flock to cities. Improving the utilization rate of urban space has become one of the effective ways to solve the problem of urban congestion. In the process of integrating green building into urban planning and design, it is not only necessary to innovate technology and apply those research results with ecological value, but also to innovate construction equipment, so as to ensure more reasonable energy consumption and improve the overall utilization of resources in the process of urban construction and planning [9]. This can not

only reflect the ecological value in the process of urban planning, but also provide more impetus for the sustainable development of the city and the establishment of a harmonious society, so as to realize the green and sustainable urban construction and development. In the planning and design of urban green buildings, we should deeply investigate the city, understand the historical development, cultural connotation and customs of the city, and fully reflect the unique charm of the city.

2.2 Promoting Urban Economic Development

Under the action of urban planning and design, the direction of urban macro-economy can be rationally adjusted, and the functions of relevant departments can be brought into full play. Under the action of urban planning and design, all kinds of existing urban resources can be scientifically distributed and regulated, which is conducive to stabilizing low prices and promoting the coordinated development of urban economy and urban natural environment. In addition, urban planning and design is also conducive to the continuation of urban culture. The full combination of green building and urban planning will help promote the development of local concepts such as low carbon and green, and gradually form a strong concept of environmental protection in local culture, which will continue to promote the progress of the construction industry, and is of great significance to promote the overall progress of local economy and society. Scientific urban planning and design can create a good cultural atmosphere. Design can create a good cultural atmosphere, protect all kinds of buildings with far-reaching historical and cultural significance, and on the basis of continuing urban culture, fully display the city's characteristics and unique charm. Urban green building planning and design personnel should conduct in-depth analysis and exploration on the form of green building in their daily work, so as to make the green building Zi 'an consistent with local economic, ecological and other factors, promote the development of surrounding areas in a long time, and promote the local core competitiveness. In order to achieve the strategic goal of Shenzhen's economic development, the master plan makes overall arrangements for the industrial layout within the city, and adjusts, transforms and migrates the original labor-intensive industries in the special zone.

2.3 Achieve the Building Goal of Energy Conservation and Emission Reduction

Guided by the concept of green building in the process of design and construction, the city can not only actively improve the traditional urban building mode, but also achieve the building goal of energy saving and emission reduction. This is because the main feature of green building is the rational use of resources, which is the energy-saving function that people often talk about. One of the most important characteristics of green buildings is energy saving, which mainly uses natural resources, reduces the application rate of electric energy and heat energy, reduces people's living costs, and brings good energy-saving response to society. Energy conservation plays an important role in the present society. Green building advocates the rational use of natural resources, and reduces the use of electric energy and heat energy in the building and design process, which can reduce people's living costs in urban life and bring better energy-saving impetus to social development. Figure 1 shows the types of mutual assistance practices in environmental and ecological construction.

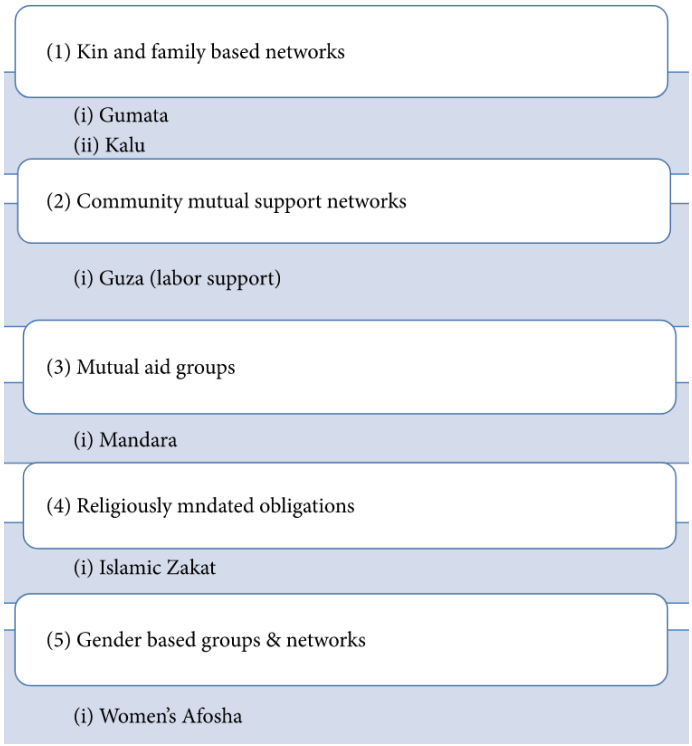

Fig.1 Types of Mutual Assistance Practices in Environmental and Ecological Construction

From the total number of green buildings in China, there is a big gap in green buildings needed by urban construction. Therefore, urban architectural planning units should study green building forms suitable for local characteristics. Green buildings can make rational use of various resources and reduce the consumption of resources in the process of planning and design, which is in line with the needs of current national development and social construction. Therefore, green building can provide more scientific guidance in the process of urban development, and reduce the consumption of various resources and energy on the basis of satisfying urban construction, so as to achieve the architectural goal of energy conservation and emission reduction. Incorporating green buildings into the process of urban planning can change the building mode that used to take resource consumption as the basis and get rapid development. At the same time, the green building integrates the design concept of low carbon and environmental protection into the urban cultural construction, so that people can get more spiritual education and enjoyment, so that the city can realize the coordinated development of economy and civilization construction.

3. Key Points of Green Building Planning and Design

3.1 Rational Planning of Construction Land

Land for national construction or rural construction must be comprehensively and rationally planned, and the concept of saving land should be effectively implemented. When using land, if conditions permit, use sloping land or poor land as much as possible, and do not occupy or occupy less cultivated land area. From the angle of architecture, we should analyze the land saving, plan the construction land, and reduce the occupied area as much as possible in the construction activities. When planning and designing green buildings, we should first set specific goals. From the perspective of the city, the cultural charm of the city itself and its future development trend are comprehensively considered, and the overall understanding and layout of the city are carried out.

Only in this way can the planning and design be more scientific, reasonable and perfect. From the perspective of architectural planning and design, it is necessary to strengthen the reconstruction design of multi-storey buildings, improve the floor area ratio of buildings, broaden the utilization range of underground space and increase the urban capacity. The time relationship between the various stages of green building technology is shown in Figure 2.

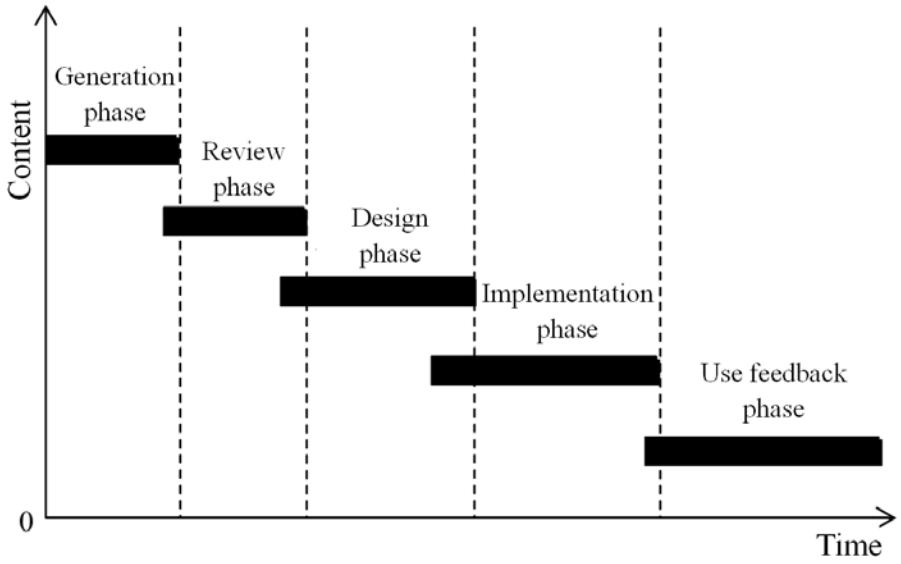

Fig.2 The Relationship in Time between the Various Stages of Green Building Technology

In the planning and design of green building, it is necessary to strengthen the use of land, improve the concentration of residential land and protect the environment. For designers, the planning and design of urban green buildings has high requirements. Designers should not only put forward reasonable plans for the development and planning of city image, but also consider various economic development indicators abstractly and fully integrate them according to the situation of urban economic development and social development. In the planning and design, it is also necessary to fully excavate and integrate the city's own cultural heritage and connotation.

3.2 Humanized Design Concept

The purpose of urban green building planning and design is to further improve the living environment of urban residents, improve their living taxes and quality of life, and realize the harmonious development of social economy and ecological environment. The ultimate goal of green building planning and design is to make people have a more comfortable living environment. Therefore, when planning and designing green buildings, planners must integrate the humanized design concept and rely on the concept that architectural design is to serve people, so as to better prevent the phenomenon of re-application and clear effect. For the planning and design of urban green buildings, attention should be paid to the construction of harmonious society. In cities, besides paying attention to the optimization of ecological environment, we should also consider its rationality in the overall urban planning to ensure that it can coexist harmoniously with urban industrial development. In the planning and design of green buildings, it is necessary to thoroughly inspect and study the geological exploration in the region, determine different building schemes for different geographical locations, protect the ecology of the environment, and innovate the ecological characteristics. In the process of development and construction, energy-saving building materials should be used, and green buildings should be done well to prevent environmental damage. Only when the environment and architecture are harmoniously unified can the connotation

of green building be truly embodied. In the planning and design of urban green buildings, we should adhere to the basic principle of harmonious development, give overall consideration to urban planning and design, and realize the harmonious unity of urban economic development and ecological environment optimization.

4. Planning and Design of Green Buildings in High-Density Cities from the Perspective of Carbon Neutralization Policy

4.1 Urban Spatial Layout

The overall urban planning of Shenzhen has fully considered the two regional relations of Shenzhen Hong Kong cooperation and the connection of the Pearl River Delta. As the only city bordering Hong Kong on land in China, Shenzhen should make use of the differences in resource distribution and production factor costs between the two places, establish a reasonable regional division of labor, expand Hong Kong's production and living space, so as to expand its market space, and strengthen the external conditions and internal capacity of Shenzhen to build an international city. In the process of urban planning and design, planners should put the design of urban open space in a key position, accurately grasp the relationship between urban sustainable development and urban planning and design, and plan and design urban open space scientifically. In the process of design and construction, the city takes the concept of green building as a guide, so it is necessary to think creatively and break through the current key technologies, and gradually change the old design concepts and methods. By analyzing the current situation of urban planning and architectural design, we can find that in the process of urban green building design in China, there are some problems, such as attaching importance to design image but neglecting practicality, and the imbalance between commercial value and ecological value, which affect the overall architectural design effect. In urban planning and design, urban planners should pay attention to the planning and design of green transportation, optimize the development mode centered on public transportation, scientifically plan the existing land resources in cities, and skillfully integrate them into urban transportation construction. Low-carbon transformation is not an obstacle to economic development, but an inevitable requirement for building a new development pattern and promoting high-quality economic development, and it is the only way to seek a more inclusive and resilient sustainable growth mode.

4.2 Urban Open Space

In the process of incorporating green buildings into urban planning, designers need to grasp the cultural heritage of the city, and apply various cultural elements to the urban design, so that the humanistic function of the city can be more prominent. Only in this way can planning and design be considered from a comprehensive perspective, and the city's economic development, cultural construction and ecological planning can be effectively integrated, and the quality of urban planning and design can be improved. Mitigation and adaptation are the two driving wheels for cities to cope with climate change. China’s climatic conditions are complex and the ecological environment is fragile as a whole. Many cities along the coast and plateau are extremely vulnerable to climate change. Preventing climate risks and ensuring ecological security requires strengthening the synergy of mitigation and adaptation to climate change, and improving the climate resilience of cities [10]. The government conducts carbon verification on companies participating in the carbon trading mechanism. In period t, the calculation formula for the CO_2 emissions of enterprise j in sector i is:

$$E_{i,j,t}^{c} = \frac{11}{3}\sum_{n=1}^{6} a_n b_n c_n F_{n,i,j,t} \quad (1)$$

Among them, $E_{i,j,t}^{c}$ is the carbon emissions of enterprise j in production sector i during the t period. a_n, b_n, c_n and $F_{n,i,j,t}$ are respectively the conversion factor of energy n used by the enterprise, the oxidation rate of carbon emission factor and the consumption.

Urban planners and designers cannot set high-rise buildings in the upwind position of the city, otherwise, the normal air circulation will be affected, which is not conducive to the exchange of air within the city, and affects the air quality within the city. It is necessary to dynamically control the height of the designed high-rise buildings, instead of blindly pursuing height to improve the utilization rate of urban space, and accurately grasp the height difference between high-rise buildings. In the aspect of ecological construction, urban planners should pay attention to urban ecological construction, objectively analyze a series of ecological problems in urban construction in all directions, scientifically plan the ecological environment, and ensure that urban diversified species can develop well in the process of urban construction.

5. Conclusions

In the development and construction of modern cities, people pay more and more attention to the protection and coordination of ecological environment while vigorously developing the economy. Only by achieving the harmonious unity of economic development and ecological environment can we ensure a good sustainable development state of the city. It is of many meanings to integrate green buildings into urban planning, which can not only actively improve the traditional urban building mode, but also achieve the building goal of energy saving and emission reduction, so that the city can realize the coordinated development of economy and civilization construction. Under the background of social market economy, the process of modernizing cities is accelerating. China must base itself on the basic national conditions, adhere to the concept of urban sustainable development, and correctly understand the orientation of urban planning and design in all directions, which should be regarded as a key work in the process of urban construction. Designers need to choose building technology and materials reasonably, consider planning and design from a comprehensive point of view, and reduce the consumption of resources, so as to realize green urban architecture. In addition, in order to improve the rationality of urban planning and the scientificalness of architectural design, designers need to carry out the overall design based on green buildings. On the one hand, the overall urban planning of Shenzhen strictly controls the growth of urban population according to the comprehensive resource capacity, urban development potential and employment demand level of Shenzhen, and gradually optimizes the population structure and improves the quality of urban population. On the other hand, the planning also fully considers the particularity of Shenzhen's population development, integrates the social needs of the non resident population into the planning category, and controls the spatial distribution and development timing, so as to promote the social progress and equity in the process of sustainable development of the city.

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