

Research on Spatial Form Optimization of Medium-sized Cities in China from the Perspective of Compact Cities

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Abstract: With the continuous improvement of the national economy, the efficient use of land has become the main direction of urban construction in China. The development mode of medium-sized cities has also changed from traditional to intensive and connotative, and finally constructed a compact urban spatial form. In addition, urban spatial expansion is the key to economic development, and urban construction is the main way of spatial form expansion. However, in pursuit of maximum benefits, many cities neglect to pay attention to the urban spatial ecological environment, which makes the urban environment worse and worse. Based on this, this paper analyzes the spatial form optimization structure of medium-sized cities in order to improve the quality of urban environment.

1. Research Background

1.1 Literature review

Industrialization promotes human civilization to the era of big machine industry, but at the same time, it also extends a series of urban problems such as resource shortage, traffic congestion, environmental pollution and so on. Moreover, in the process of rapid urbanization in China, the problems of land use, ecology, transportation and spatial structure are the most serious (Lv and Sun, 2013). Under the background of new city construction, the construction of cities and towns with shortage of land resources is constrained, and the concept of compact city is transformed from theory to fact. Urban density, spatial structure, public transport and infrastructure all exert influence on the spatial layout of large cities. However, the research on optimizing the urban spatial structure is still one-sided (Zhao, 2012). This paper mainly studies the spatial structure of compact cities, at the same time, it also studies the layout of medium-sized urban areas, the optimization of new and old urban construction functions, and the construction of urban ecological structure, and puts forward some strategies and suggestions. In addition, the construction of new zones in medium-sized cities is the main driving force to promote urbanization. Due to the limitations of history and culture, unreasonable development and pollution have a serious impact on urban construction (Li et al, 2014). In the development and construction of new urban areas in medium-sized cities, some areas only pay attention to the speed of construction, ignoring the importance of urban space to environmental quality. However, in the process of modern urban construction, we should coordinate the development of ecological problems and urban land use problems, and make full use of the advantages and disadvantages of compact medium-sized urban morphological structure and urbanization process. Construction in development and development in construction (Wang and Fang, 2017). The feasibility of the optimization method based on “compact city” is discussed when establishing the relationship between the internal and external structure of the spatial form of medium-sized cities, and the optimization evaluation and analysis are carried out. Considering the current development trend of China, the strategies of enterprise reserve and transportation infrastructure reserve construction land are put forward. Prepare in advance for the development of airports, high-speed rail stations, urban light rail construction sites (Qiao et al, 2016).

1.2 Purpose of research

With the acceleration of urbanization in China, the rural population has been pouring into cities, which has doubled the number of urban population and increased the bearing pressure of cities. Therefore, while entering a well-off life, Chinese society should also consider the carrying capacity of the city itself. The construction of new urban districts in medium-sized cities is undoubtedly the first way to solve the problem of urban housing. However, in the face of increasingly compact urban spatial structure, it is necessary for the city government to make corresponding optimization or renewal plans. Priority should be given to urban environment, transportation, housing and education, so that people can feel the convenience and quickness brought by modern cities under the conditions of meeting objective facts. This paper attempts to study from three aspects: urban space optimization, urban layout optimization and urban ecological construction. While drawing lessons from and comparing the experience of foreign scholars, we should develop the spatial development form structure suitable for medium-sized cities according to the national conditions. From a compact perspective, this paper studies the changes of the spatial structure of medium-sized cities.

2. Spatial Form Characteristics and Optimizing Principles of Medium-sized Cities

2.1 Spatial Morphological Characteristics of Medium-sized Cities

With the continuous improvement of China's comprehensive national strength, China's urbanization process shows a rapid growth trend. The process of urbanization refers to the process of transformation from rural to urban areas. From the second half of the 19th century to the middle of the 20th century, due to the invasion of world powers and the chaos of warlord separatism, the development of urbanization in China is unbalanced (Jiatang, 2019). Since the mid-1950s, the social structure of urban-rural dual division has been established, which has made urbanization stagnate for a long time. After the reform and opening up, the process of urbanization in China has accelerated significantly. The urbanization of modern China can be roughly divided into four stages.

In the first stage, from 1949 to 1997, China was in the period of industrialization, mainly building independent mining areas and industrial satellite cities based on local resources. In the second stage, from 1978 to the end of 1980, after the Third Plenary Session of the Eleventh Central Committee, China established the policy of reform and opening up, and established several special economic zones successively. At the same time, some regions also built science and technology development zones and economic and technological development zones around medium-sized cities. In the third stage, from the beginning of 1990s to the end of 1990s, China began the upsurge of building development zones again. The types and functions of new zones are gradually enriched, including special economic zones, bonded zones, development zones, logistics parks, university towns and high-tech zones. In the fourth stage, with the continuous adjustment and optimization of the national policy, the new area constructed by China in the 21st century has changed from a single development functional area to a multi-functional comprehensive urban new area.

2.2 Principles for Optimizing Spatial Form of Medium-Sized Cities

2.2.1. The Principle of Integrity

In the Athens Charter promulgated in 1993, it was pointed out that modern cities should have jobs, transportation, housing and entertainment. As the carrier of people's daily life activities, the layout of urban spatial functions seriously affects people's quality of life and work efficiency. In addition, as a comprehensive spatial system, the city must be regarded as a whole and follow the principle of urban integration (Jing, 2013). Considering people's sense of demand and experience as the main body of space use, we should also consider the relationship between urban ecological environment protection, urban green vegetation coverage, shaping characteristic cities, urban health construction and urban land use and economic development. Only by doing a good job of the related work on the integrity of the city, can we build a service-oriented city that can conform to the

people's will and the people's will. The construction of spatial form of medium-sized cities needs to be coordinated and unified with the natural environment to form a complete and continuous urban spatial form.

2.2.2. Principle of identifiability

Building a city with high recognition can not only make the city more widely known in society, but also make the city economy develop rapidly. Kevin Lynch, a famous American designer, mentioned in his "City Image" that "a city with its own characteristics must be highly recognizable, so that people in the city are impressed" (Huang et al, 2015). Therefore, on the basis of following the integrity, we should integrate the principle of identifiability, highlight the city's characteristics and enhance the city's charm. On the one hand, in terms of natural factors, we should make full use of natural geographical resources according to local conditions. On the other hand, under the artificial environment factors, the urban road network shape, architectural style and open space can be reasonably controlled to create a characteristic medium-sized urban spatial form.

2.2.3. Accessibility Principle

In the construction of urban spatial form design, we need to fully consider the quality of urban traffic and spatial environment, so we should consider the principle of accessibility. Accessibility is mainly divided into two aspects: traffic accessibility and visual accessibility. Traffic accessibility is mainly manifested in people's daily travel. Visual accessibility is mainly manifested in the urban public open space, characteristic landscape, characteristic architecture and other physical and spatial elements can be visually appreciated and perceived.

2.2.4. Principle of ecological priority

Harmonizing the relationship between urban space and natural environment space is the basis of urban development. In the past few years, China's urbanization process has only pursued immediate economic benefits, vigorously developing heavy industry, thus ignoring the importance of ecological environment to urban construction. According to the statistics of the national environmental department, the urbanization rate of land in China has been higher than that of population in the past 30 years. So to a certain extent, it highlights the problems of construction land in some new areas of medium-sized cities, such as the phenomenon that urban land occupies mountains and forests and destroys River systems. The Eighteenth National Congress of the Communist Party of China (CPC) put forward the policy of protecting natural resources and environment construction. In addition, President Xi put forward the urban development concept of "green water and green hills are Jinshan and Yinshan". The main purpose is to coordinate the development relationship between cities and ecological environment.

3. Content Analysis of Space Optimization in Medium-Sized Cities

3.1 Elements of simplified form in medium-sized cities

American scholar Hamid Shivani divides urban form elements into eight categories in Urban Design Procedure: open space, sign, traffic and parking, land use, building form and volume, crosswalk, maintenance and support activities.

3.2 Spatial structure of medium-sized cities

Under general conditions, urban construction can be divided into two types: natural elements and artificial elements. Natural factors include river system, ecological green space and topography (Zhao et al, 2011). Artificial elements usually include: urban road network skeleton, landscape gallery, axis and material space composed of buildings.

3.3 Functional organization of land use

Urban land use is the reflection of urban construction in three-dimensional space. In addition, the construction of three-dimensional spatial form of medium-sized cities has a great impact on the

functional layout of urban land. There is an interactive relationship between them. Urban construction carries out corresponding development activities for urban land, and urban land corresponds to different types of ground construction and urban activities.

3.4 Open Space Organization

The accessibility and publicity of urban open space should be guaranteed in the design and organization of open space in new urban areas. In addition, urban development space is an important place for people to perceive urban spatial environment and urban development (Yang et al, 2011). Kevin Lynch, a famous American scholar, believes that open space can be divided into two categories, one is the natural environment outside the city, the other is the outdoor public space inside the city, mainly providing outdoor sports and entertainment places for residents.

3.5 Road network morphological organization

Urban traffic is the bridge link to maintain normal operation in the four major functions of the city. In addition, road network refers to the traffic road transport network in the city. While ensuring people to carry out space development activities in medium-sized cities, they can also coordinate the relationship between road network and urban construction. Reasonable construction of traffic roads can improve the participation of citizens in urban activities, and urban streets with appropriate environment can also improve people's understanding of urban spatial form.

4. Suggestions on Optimizing Spatial Form of Medium-Sized Cities

4.1 Suggestions for Space Boundary Optimization

In order to optimize the spatial boundary of medium-sized cities, we should first strengthen the awareness of ecological environment protection. Specifically, while publicizing urban construction, we should increase publicity on environmental education for citizens. In this way, we can enhance the public awareness of the protection of the ecological environment, so as to reduce the impact of urban construction on the ecological environment. Secondly, the damaged ecological environment should be restored. In view of the damaged marginal areas of medium-sized cities, the staff of relevant government departments should invest in ecological restoration work as soon as possible, and build ecological protection circle again. On the boundary of medium-sized cities, an effective green ecosystem can be formed through the green ecological layout, which can not only purify the air and water sources, but also improve the physical and mental health of citizens. Finally, the corresponding management laws and regulations should be established. While planning the period of protection, we should delimit the compact boundary of the outer space of the county, and constantly improve the border management mechanism of the medium-sized cities.

4.2 Suggestions on Optimization of spatial structure

In the aspect of spatial structure optimization, firstly, the interconnection between urban systems should be strengthened to enhance the compactness of urban space. Relevant departments should make timely preparations for construction and development, and increase the organic links between urban areas, especially the links between road networks. At the same time, we need to consider actively coordinating related work and enhancing space cohesion. Secondly, the spatial relationship between the old and new urban areas is sorted out, and the old urban areas are constantly optimized and updated. In the process of space optimization, the original ancient buildings should be retained, the urban spatial structure should be closely integrated with the old urban areas, and the internal layout should be optimized and adjusted scientifically and rationally to improve the situation of road congestion in the old urban areas. Finally, we should attach importance to the construction of new functional government districts and share administrative functions. In the process of construction, we should respect the ecological background, attach importance to the construction of new government areas, actively share the administrative functions of old urban areas, and alleviate the shortage of construction land in old urban areas.

4.3 Suggestions on Land Layout Optimization

In the optimization of land use layout, first of all, we should speed up the renewal and reconstruction of residential land. As far as optimizing the functional layout is concerned, optimizing and renewing old residential areas can not only reduce the density of old urban areas, but also release the land with low utilization rate, thus alleviating the urban problems such as the shortage of construction land within the city. Secondly, the construction mode of moderate development should be used to improve the living conditions of residents. Specifically, the use of residential management mode in urban construction can not only alleviate the traffic congestion caused by the original mode, but also reduce the noise on the street to a certain extent. Finally, we will increase investment in various types of public facilities. Creating green urban structure and social public space makes the quality of life of residents and the image of cities and towns constantly improve. Using the concept of people-oriented to coordinate the development of medium-sized cities and ecological environment, focusing on improving the efficiency of efficient operation of public service facilities.

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