

The Development Course and Related Planning Theory Application of Zhengzhou

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Abstract: Zhengzhou city is a transportation hub and a regional central city in China. Since the reform and opening up, Zhengzhou has developed rapidly, and its main development direction has also undergone different degrees of change. In recent years, with the development of Zhengdong New Area, Aviation Port Area and Metropolitan Area, the urban spatial structure has undergone great changes. This work presented the urban development process, the evolution stage of spatial structure and the applied planning theory reflected in this process, and proposed the suggestions for the future urban development planning.

1. Urban development process of Zhengzhou

Zhengzhou has a long history, but its modern urban development began in the early 20th century, and can be roughly divided into five stages.

1.1 The stagnant development stage before the Ming and Qing Dynasties

While most of the Ming and Qing dynasties, Zhengzhou was the capital of Zhengzhou Zhili state with the jurisdiction of Xing Yang, Ying Ze, He Yin and Si Shui counties. As the shell of Zhengzhou, the "city" was built in the fourth year of Tang Wude, with 9 li and 30 steps around the city. Its form and pattern fully reflect the characteristics of a Chinese traditional political functional city. The whole "city" is a regular rectangular, with the extension from east to west, and presents micro narrow trend from north to south. The whole pattern is facing four directions, and there are four towers on the city gate, around the city trenches. The east and west gate is opposite, forming a street across the center of the city. The north and south gates are interlinked, extending from the entrance to the city into a street at a right corner of the street and running into the east and west gates, thus forming two cross-shaped structures. Other streets in the city either intersect at right angles, or be parallel, vertical and horizontal intersection with the city, forming a regularly orderly square structure.

1.2 The initial development stage after the opening of Jinghan and Longhai Railway (1906-1949)

It is the opening of the Jinghan and Longhai railways that provide opportunities and impetus for the rapid development of Zhengzhou commerce. The intersection of the two roads in Zhengzhou provides the premise for the development of Zhengzhou to gather various resources. It not only promotes the rapid commercial development of Zhengzhou, but also has an important impact on the formation of the urban spatial structure of Zhengzhou in modern times and even today. The early development pattern of Zhengzhou urban spatial structure in modern times made it basically limited to the east of Jinghan Railway, north of Longhai Railway and between the old city of Zhengzhou.

In the Republic of China period, Zhengzhou formulated the Zheng Bu Design Map in 1927, the Draft Construction Plan of Zhengzhou New Urban Area in 1928, the Outline of the Preliminary Construction Plan of Zhengzhou Reconstruction Planning Steering Committee in 1946. However, urban planning, as a government function, it is an intervening force for urban construction and development under the premise of the effective guarantee of laws and regulations. In the late Qing Dynasty and the beginning of the Republic of China, its impact on the urban spatial structure of Zhengzhou was relatively limited. Therefore, the urban spatial structure change of Zhengzhou in the

late Qing Dynasty and the Republic of China was spontaneously formed under the influence of railway and driven by commercial development. From the outbreak of the War of Resistance against Japanese Aggression to the liberation, the space scale and structure of Zhengzhou city did not change much due to the long war.

1.3 Axis expansion stage from the early years of the People's Republic of China to the reform and opening up (1949-1977)

After liberation, because Zhengzhou has the geographical advantages of developing the cotton textile industry, Zhengzhou was positioned as one of the six major cotton textile industry bases according to the principle that the cotton textile industry should be close to the origin of raw materials in China. As one of the 20 key construction cities identified by the whole country, it has directly completed the transformation from a general small city to an emerging industrial city, a transportation hub city and a provincial capital city. Zhengzhou received a large amount of capital investment from the national and local governments, and achieved the rapid expansion of urban space. The built-up city area was expanded from 7 km² in 1952 to 56 km² in 1960.

According to the overall plan of Zhengzhou compiled in the 1950s, taking the Beijing-Guangzhou Railway as the boundary and the Longhai Railway as the axis, Zhengzhou are expanded in the east and west. With Beijing-Guangzhou railway as the boundary, Zhengzhou is divided into east and west: the west is industrial area and storage area, and the northeast is administrative cultural area. The urban spatial structure of the single center of the whole city has initially taken shape. The urban structure formed during this period has laid the basic pattern of modern urban space expansion in Zhengzhou.

In this period, the whole urban spatial expansion was mainly characterized by the accelerated industrial construction and the expansion of industrial land, which reflected the urban development policy of producing first and living later in a specific period. After the "Cultural Revolution", due to political reasons, the development of Zhengzhou was affected to a certain extent. Thus the momentum of the city's outward expansion was greatly weakened, and there was no substantial change in the spatial structure.

1.4 Accelerated development stage since the reform and opening up (1978-1999)

After the reform and opening up, Zhengzhou's urban construction has developed at an unprecedented speed. The overall plan of Zhengzhou, compiled in 1982 and approved in 1984, has clarified the nature, scale and development direction of the city. Since 1990, China's political economy has experienced two historic transformation from the traditional economy to modern economy and from the planned economy to market economy. The reform of the system of paid use of urban land and the commercialization system of urban housing resulted in a significant impact on the urban development. As such, the land development mode has undergone fundamental changes, and the land price has become the commodity economic lever to adjust the urban spatial layout.

During this period, the urban land structure of Zhengzhou was differentiated and the spread development trend appeared to be heterogeneous due to the great acceleration of the development speed. The double "V" urban structure separated by the north railway marshalling station and the two major railway lines was formed and intensified. Due to the inconvenience of external travel, the development of double "V" shaped medial land in the northwest and southeast has lagged behind other areas for a long time, forming a "vacuum" zone of urban development.

The construction of development zones forms an "enclave type" urban space. Under the influence of the national construction boom of the development zone in the early 1980s, relying on the original industrial land, Zhengzhou urban area has expanded to the northwest and southeast, and set up high-tech development zones and economic technology. The land used in the development zone is far away from the main urban area, changing the peripheral boundary line of the urban built-up area, forming an "enclave-type" urban land use form, and providing space for the further expansion of the city.

Improvement in traffic conditions has widened the urban framework. With the continuous improvement of urban marginal roads, major areas with poor radiation accessibility are constantly filled. The improvement of the ring road system has changed the single road network structure system,

alleviated the pressure of transit traffic on the urban center, decomposed part of the functions of the central urban area, and widened the urban framework.

1.5 Leapfrog development stage in the background of rapid urbanization (2000 to present)

With the aggravation of urbanization process and the increasing improvement of urban functions, Zhengdong New District with high starting point and high grade is planned and built in the east of the main urban area of Zhengzhou to realize the leapfrog development of urban space.

In 2016, according to the Development Plan of Central Plains Urban Agglomeration approved by the State Council, the development path of Zhengzhou was determined as the core drive and axis orientation, to promote the international development of Zhengzhou metropolitan area and the modern development of transportation network. With the support of Beijing-Guangzhou, Longhai and other main modes of transportation, the "mi"-shaped comprehensive economic development axis was built. This forms a half-hour, one-hour and 1.5-hour transportation circle, which accelerates the construction of high-speed railway, promotes the efficient connection of various transportation modes, and forms a cross-regional multi-path and high-quality modern transportation network. With the help of such transportation advantages, it improves the system and mechanism of integrated development, promotes complementary functions and the joint construction and sharing of public services, and forms a networked, cluster and intensive metropolitan urban space system.

2. The main theoretical basis of Zhengzhou urban development planning

From the above urban development and evolution process of Zhengzhou, it can be seen that the development planning of a city can not be done at one kick. It is revised step by step with the planning ideas and theories with ages and the accumulation of the times.

2.1 Traditional urban planning thought in ancient China

City walls and cities in China appeared very early. The recorded urban development began in the Zhou Dynasty, and produced a set of urban construction system and planning system. It is recorded in the Records of Zhou Li Kao Gong: "When the architect built the capital, the city was square with nine miles long with three gates. There are nine north and south avenue and nine east and west avenue in the city. Each avenue has a width of nine carriages at the same time. On the left of the palace is the ancestral temple, and on the right is the country. In front of the palace is the courtiers and behind is the market. The length of the markets and pilgrimage is one hundred steps." This construction system has become the representative of the urban planning ideas in ancient China, and has played a decisive role in the subsequent urban development.

Before the Ming and Qing Dynasties, Zhengzhou preserved the pattern characteristics of Chinese traditional urban planning. The "city" is a regular rectangular shape surrounded by the city wall and the two main street rings in the city, forming a regular and orderly square structure. The ruins of the Shang Dynasty capital still remain in the Guancheng District of Zhengzhou.

2.2 Western urban planning thought

After the founding of the People's Republic of China, although the connection with the western countries was cut off and the western urban planning theory was not introduced, the shadow of the western urban planning theory can still be found in most urban construction in China. The western urban planning ideas introduced in modern China include classical planning, urban beautification movement, functional planning, rural urban theory, organic evacuation theory, satellite city theory, regional planning thought, etc.

1) Functionalist planning theory

The Charter of Athens was translated and published twice in the early days of the founding of the People's Republic of China, namely the Town Plan Program published in 1949 and the The City Plan Outline published in 1951, emphasizing the importance of urban functions and raising the core issue of functional urban planning.

In the 1950s, the planning of Zhengzhou reflected the thought of functional zoning, which was divided into two east and west districts with the Beijing-Guangzhou Railway as the boundary. The west area is an industrial zone and a storage area, while the northeast area is an administrative and cultural area. The whole urban built-up area is basically circular and distributed with the Erqi Tower and the railway station as the center. As such, the urban functional zoning is obvious.

2) Rural city theory, organic evacuation theory, and satellite city theory

After 2000, due to the previous spread of urban construction and development, urban problems such as traffic congestion and environmental quality deterioration in urban centers are increasing. Influenced by the theory of "rural city" and "organic evacuation", the construction of the new district was carried out in Zhengzhou. By the end of 2020, Zhengzhou has 6 districts, 5 cities and 1 county, as well as Zhengzhou Airport Economic Comprehensive Experimental Zone, Zhengdong New District, Zhengzhou Economic and Technological Development Zone, Zhengzhou High-tech Industrial Development Zone. This makes Zhengzhou develop from a single center urban structure to a multi-core group urban structure, realizing the transfer of the urban center of gravity and the relocation of urban functions, which is conducive to the leapfrog development of urban space.

3) Metropolitan circle theory

Metropolitan circle theory, also known as urban agglomeration theory, is one of the basic theories of regional development. The metropolitan circle is a spatial form of urbanization within the urban agglomeration, the large cities or large cities with strong radiation driving function as the center, and the one-hour commuting circle as the basic scope. The metropolitan circle has two distinct characteristics. On one hand, it is composed of big cities and adjacent areas in space, presenting the spatial structure of the center and the periphery. On the other hand, the big cities in the metropolitan circle have a strong agglomeration force and a high level of regional integration development.

Zhengzhou is located in the central region of China, across the east and west, vertical to the north and south. According to the State Council on December 28, 2016 approval of the central plains city agglomeration development planning, the central plains city agglomeration construction is divided into the following parts: China's Economic Development New Growth Pole, National Important Advanced Manufacturing and Modern Service Industry Base, Midwest Innovation Entrepreneurship Zone, Inland Two-way Open New Heights and Green Ecological Development Demonstration Area.

2.3 The Soviet Union urban planning thought;

The urban planning thought of the Soviet Union is the foundation of the establishment of the urban planning theory in New China, and it has the most far-reaching and direct impact on the urban planning and construction of New China. The main characteristics of the Soviet Union urban planning theory are: urban planning is the continuation and embodiment of the national economy, and the characteristic of the socialist city is productive.

Under the influence of the Soviet urban planning theory, the Communist Party of China put forward the policy of "transforming consumer city into production city" in the early stage of new China. This guiding ideology had a decisive influence in the first 30 years. Zhengzhou was positioned as one of the six major cotton textile industrial bases in China during the "First Five-Year Plan" period, and the city has achieved rapid development. The Soviet urban planning thought has had some good influence on the urban planning of Zhengzhou. For example, Soviet experts attach importance to the improvement of the living environment, production cooperation and the layout of green protective belts, and the protection of historical and cultural heritage, to ensure the coordinated development of production and life. These ideas are specifically integrated into the factory site selection scheme, which affects the implementation of the future urban construction and industrial zone planning.

3. Suggestions on the future theoretical application of Zhengzhou urban development planning

3.1 Sponge city theory

Sponge cities are paying more and more attention in the urban planning and construction, due to the deterioration of the natural environment and the more and more occurrence of urban waterlogging.

For example, the "7 20" heavy rain in Zhengzhou in 2021 caused urban waterlogging and huge losses to the city. Sponge city theory was proposed in 2012, and the city is like a huge sponge. It can discharge excess rainwater and contaminated water through its own huge natural drainage force, and also save a certain amount of water resources. It has natural penetration, natural purification, natural accumulation to ensure that the city always has sufficient water resources.

In fact, in 18 years, Zhengzhou has already begun the planning and construction of the sponge city. According to the Master Plan of Zhengzhou City (2017-2030), 191 waterlogging drainage channels are planned in the main urban area. Also, it will build and transform sponge parks and build ecological riverside buffer zones on both sides of the river. In addition, large residential areas, enterprises and institutions, schools, hospitals, hotels and other gradually build rainwater environment water projects. Urban sidewalk roads and courtyards, factories, office areas and other hardening areas shall use high permeability materials to facilitate rainwater collection. By 2020, the area of Zhengzhou's main urban area meeting the requirements of sponge city construction will account for about 22.5% of the total built-up area. By 2030, the area of the main urban area meeting the requirements of sponge city construction will account for about 88.7% of the total built-up area.

3.2 Ecological city theory

Eco-cities originated in the 1970s based on ecological principles, comprehensively study urban social, economic and natural systems. It is built by the application of ecological engineering, social engineering and systematic engineering for maintaining a highly harmonious urban human residential areas in highly developed economy, social prosperity, so that the people can live and work in peace, contentment, and virtuous ecological cycle. It is a good model after the city enters a new stage of development, and it is also an important way for China's ecological civilization construction and China's new urbanization.

In 2019, Zhengzhou was rated as the "National Ecological Garden City", marking a new level of urban ecological civilization construction in Zhengzhou. On January 23, 2019, the Sixth Meeting of the CPC Central Committee for Deepening Overall Reform issued "Several Opinions on Establishing a Land and Space Planning System and Supervising its Implementation" and "The Guiding Opinions on Establishing a Protected Natural Land System with National Parks as the Main Body". Among them, the scientific demarcation of "three districts and three lines", the "three lives" of production, and living and ecological space are the basic work to coordinate the scientific protection and rational utilization of natural resources and the construction of ecological city.

4. Conclusions

By combing the development process of Zhengzhou urban planning since the 20th century, the theoretical basis of Zhengzhou urban planning is discussed in this work. From the theoretical source of modern urban planning in Zhengzhou, the formation of Zhengzhou urban planning not only contains the thought of ancient Chinese and modern urban planning, but also implies the planning thoughts of western China and the Soviet Union. The development process of Zhengzhou city also reflects the different policy ideas of the country in each period. Summarizing the experience and shortcomings of early planning and development and using new planning theories to guide urban construction are conducive to the construction of urban planning with Chinese characteristics and put forward suggestions for the better development of Zhengzhou in the future.

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