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Study on the Characteristics of Modern Urban Planning and Construction in Tangshan

Yang Xu[1], Hu Yin[2], Lei Wang[3]

[1]China Academy of Building Research, Beijing, China, Beijing, China
[2]Beijing Huayuan Houyu Technology Co. Institute of Territorial Spatial Planning, Beijing, China
[3]School of Architecture and Art, North China University of Technology, Beijing, China

Abstract: ***Tangshan is an industrial and mining city that rose rapidly in the modern period due to the development of the foreign affairs movement. This paper systematically organizes and summarizes historical materials related to the construction of urban space in modern Tangshan through literature reviews, field research, and interviews. It divides the process of Tangshan's urban construction into three historical periods, categorizes the main construction contents of each phase, and maps them spatially by integrating historical records and base maps. The characteristics of Tangshan's urban construction in these three historical periods are analyzed. On this basis, starting from the method of modern urban planning theory, we analyze the main factors affecting the rapid development of Tangshan from a small village to a famous heavy industrial city in North China, and summarize the planning ideas embodied in the process of mapping out the modernization of Tangshan that are different from the traditional urban planning theories, in an effort to provide a reference for the modern research on the synergistic development of Beijing-Tianjin-Hebei, and also seek to learn from the history and to provide a reference for the resource-based cities, the It also seeks to draw lessons from history for the study of the transformation and development path of resource-oriented cities, especially resource-oriented shrinking cities.***

Keywords: Tangshan, Modern urban construction, Local urban planning theory.

1. Introduction

Before the Opium War, Chinese cities were of the feudal society type, and the types of city construction were divided into two categories, those planned and constructed due to political and military factors, and those spontaneously formed due to better regional and economic conditions [1]. After the outbreak of the Opium War, western science and technology were continuously introduced and impacted by the new mode of production, China's traditional urban planning theories could not be fully adapted to urban development, and a new way of urban planning gradually arose, and many new cities were formed in the process. Driven by the Foreign Affairs Movement, Tangshan emerged from the small village of Qiaotou Tun with the construction of the Kaiping Coal Mine [2]. It became a typical 'spontaneous' resource-based industrial city that "thrives on coal", and its urban spatial pattern and urban planning process are all unique. The coal industry, iron and steel industry, cement industry, ceramics industry, etc. developed in modern Tangshan are also important pillar industrial categories for the development of modern Tangshan, which has laid a solid foundation for the development of modern Tangshan. Although the construction content of the modern period has been seriously damaged after the earthquake, in the process of reconstruction, some of the industrial and mining enterprises, residential, commercial, and so on have chosen to rebuild in-situ, therefore, the spatial layout of modern cities has also had an impact on the urban construction of Tangshan after the earthquake. Therefore, the spatial layout of modern cities has an impact on the post-earthquake Tangshan urban construction. It is of great significance to clarify the main contents of modern urban construction in Tangshan for the study of modern Chinese history, regional study, transformation and development, and the study of urban development in Tangshan.

2. Characteristics of Urban Construction in Modern Tangshan

Before Tangshan entered modernization, there were no urban construction facilities in Qiaotou Tun, the birthplace of the city, and the basis of Tangshan's urban spatial construction was the villages scattered around Qiaotou Tun, so the evolution of Tangshan's urban spatial form was a process of from nothing to something. In this process, Tangshan gradually developed from a resource-exporting city with a single industrial category into a fully functional industrial city, and from a subsidiary coal-producing town of Tianjin into a relatively independent industrial city. In the process of urban spatial expansion, the spontaneity feature is obvious, which also leads to many spatial problems such as disorderly urban spatial expansion, mixed functional zoning, irregular architectural spatial layout, and chaotic road system.

2.1 The History of Tangshan's Modern Urban Spatial Expansion

2.1.1 Historical phasing

In 1876, Tang Tingshu went to Tangshan to survey coal and iron resources by the order of Li Hongzhang, the governor of Zhili, which provided an opportunity for the rise of Tangshan, which officially entered the modern period. The main landmark event that delineated the first and second phases was the opening of the entire Jingfeng Railway in 1907, connecting Guanzhou and Guanwai [2]. Before that, the development of Tangshan was dominated by the Kaiping Mining Bureau, after which the railroad became the main driving force for the development of the city. The main landmark event distinguishing the second and third phases was the establishment of the pseudo "Jidong Anti-Communist

Autonomous Government" in 1935, since then, Tangshan was directly under the rule of the Japanese pseudo-regime, and both the functions of the city and the construction of the urban space showed a deformed and unhealthy state of development in the wartime [3], A very different state of development and pattern of development from the previous two periods (Figure 1).

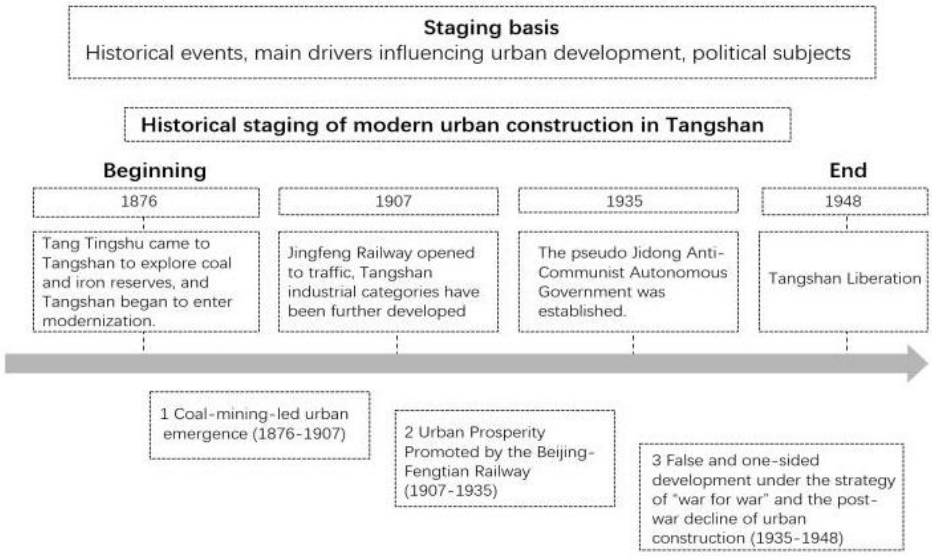

Figure 1: Historical Phasing of Tangshan's Modern Urban Construction and the Basis for Phasing

2.1.2 Coal-mining-led emergence of cities (1876-1907)

Between 1876 and 1907, under the impetus of the foreign affairs movement, Tangshan "emerged from the mines". The basic framework of the city was determined at this stage, which belonged to the initial stage of urban development. In terms of construction content, coal mining and coal mining services for the city's main functions, including coal mines, railroads, miners need to live in residential, commercial, schools, medical care, etc., in addition to the construction of higher education for the Railway Bureau and the Bureau of Mines to train professional and technical personnel - Tangshan Jiaotong University. From the spatial layout, the city construction activities centered on the Mining Bureau, concentrated in the north of the railroad [4], the production facilities needed for coal mining were concentrated in the Tangshan mine of Kaiping Mining Bureau; the living service facilities (rich people's area) built by the Mining Bureau were concentrated in the Xishankou under the Shuangfeng Mountain, the infrastructure of this area was more perfect, the environment was beautiful, and it was an area that had been planned and built in patches, and the common people's area for the life of the miners was built at the The civilian areas where miners lived were built around the train station and Kaiping Mining Bureau in response to demand and gradually became large-scale (Figure 2).

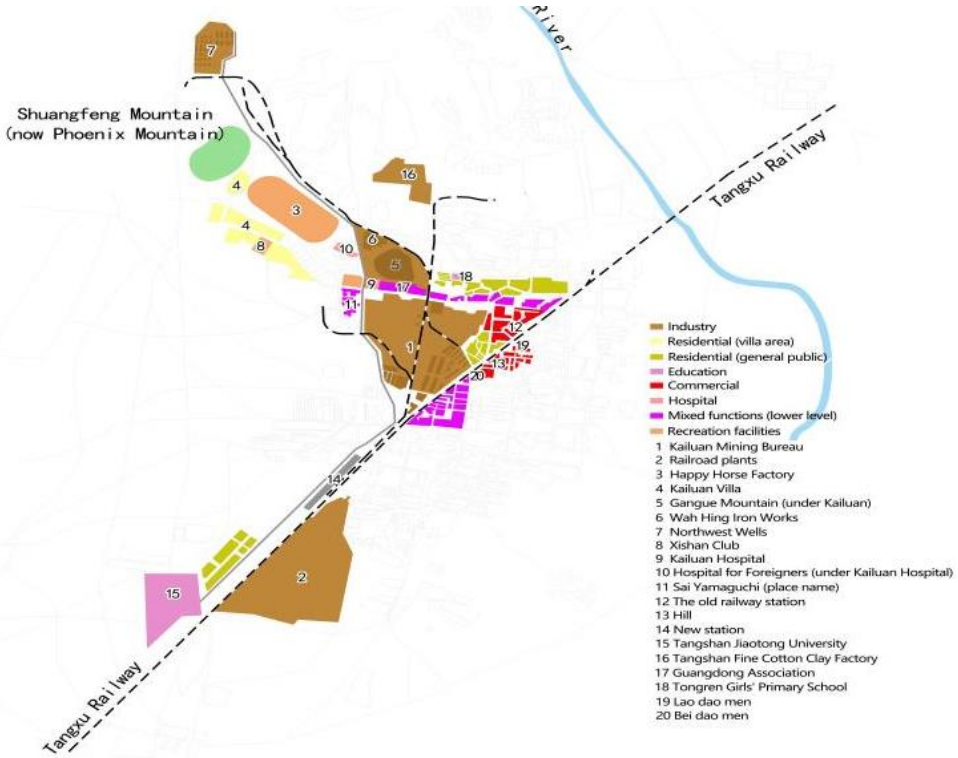

Figure 2: Spatial pattern of the city and the location of key construction projects between 1876 and 1907

2.1.3 Urban Prosperity Facilitated by the Jing-Feng Railway (1907-1935)

During the period of 1907-1935, the urban construction of Tangshan "prospered because of the road". 1907, the opening of the whole line of the Beijing-Fengxing Railway not only affected the urban pattern, but also created the conditions for the further prosperity of Tangshan's industry and commerce, and this stage was the key period for the rapid expansion of the urban space, and the urban spatial pattern basically took shape. From the point of view of the construction content, the construction project involves all aspects of production, life, social services, etc. On the basis of the previous stage, the development of cement, ceramics, textiles and other industrial sectors, and opened up a large area of residential areas, but also the construction of Xiaoshan, Huaji power plant, hospitals, schools [5-6], poor people's reformatory [7] and other service facilities, the city function is more complete. In terms of spatial layout, the city is concentrated in the west of Steep River, divided into north and south by the railroad, and the city develops along both sides of the railroad, which is connected with the surrounding villages in series. The city space north of the railroad was concentrated to expand northward, constructed factories, and built a large residential area around the factories; the villa area under Shuangfeng Mountain was further enlarged; south of the railroad, a large residential area was constructed, with schools and other urban services scattered among them, and a large-scale Xiaoshan commercial center was also formed [8-9]. In addition, all industrial and mining enterprises built branch lines connecting to the railroad, and the railroad was extended to the inner city, especially north of the railroad, where the railroad branch lines were densely packed (Figure 3).

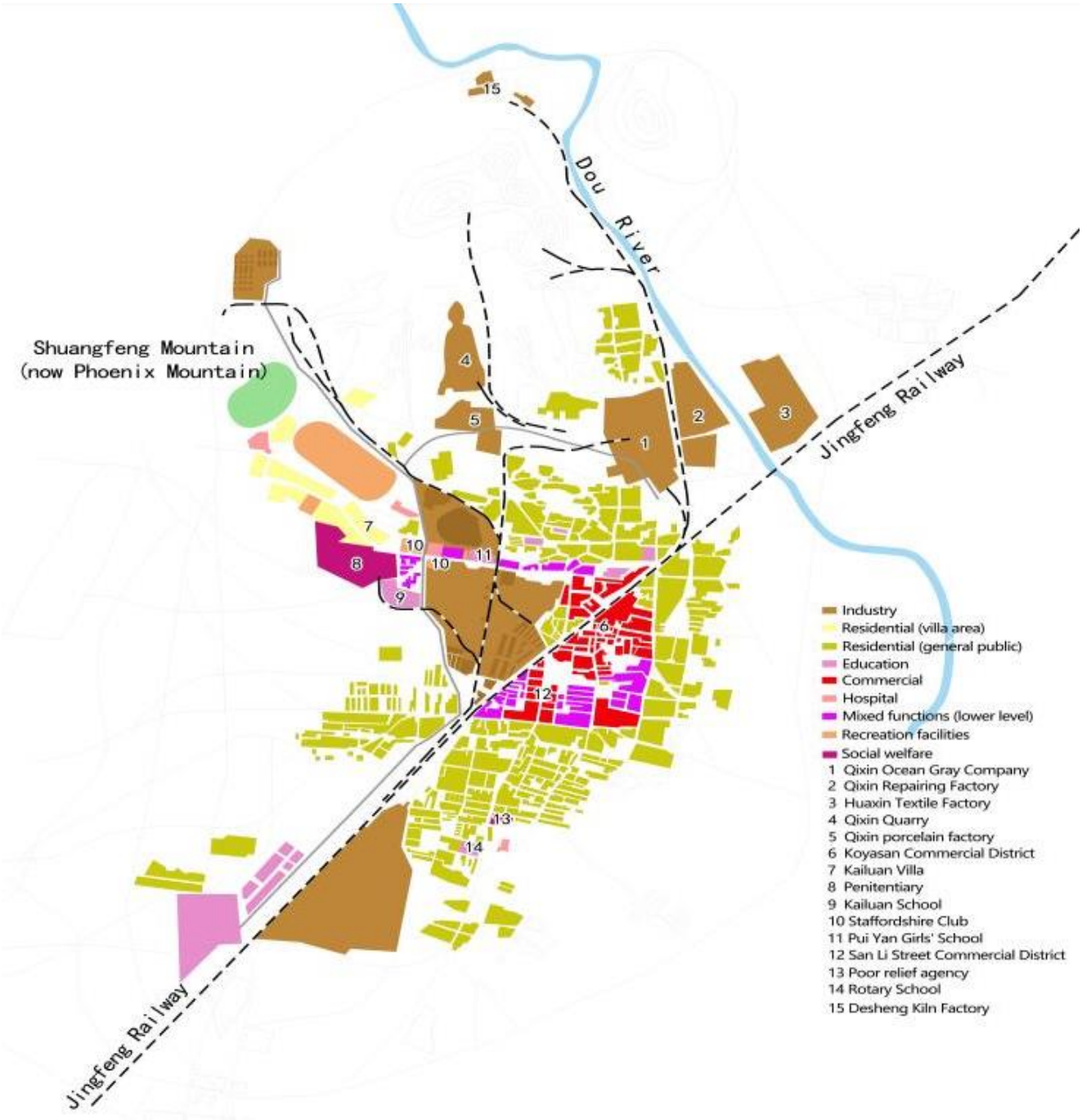

Figure 3: Spatial pattern of the city and the location of key construction projects between 1876 and 1907

2.1.4 False one-sided development and post-war decline in urban construction under the "war for war" strategy (1935-1948)

During the period 1935-1948, although the war had a negative impact on Tangshan, the Japanese invaders were not entirely without success. During this period, the Japanese pseudo-regime formulated the "Urban Plan" [10], which was not fully implemented due to political reasons, but some of the planning measures put forward in the plan had a certain guiding effect on Tangshan's urban construction afterward. Tangshan, with its rich resources and industrial products, was positioned by Japan as a reserve base for "raising war with war", and the Japanese regime built the Tangshan Steel Factory, the Tangshan Thermal Power Plant [11-12] and some roads. Although the purpose was to plunder resources, new industrial categories were added, new infrastructure was built, and commerce was further developed, the development of residential living space was slow [13]. From the spatial layout, the content of urban spatial expansion was distributed in a point-like manner, located in the periphery of the city. in 1945, after the unconditional surrender of Japan, Tangshan was taken over by the national government, and there were no larger construction activities, and the city's construction was in a state of stagnation [14] (Figure 4, Table 1).

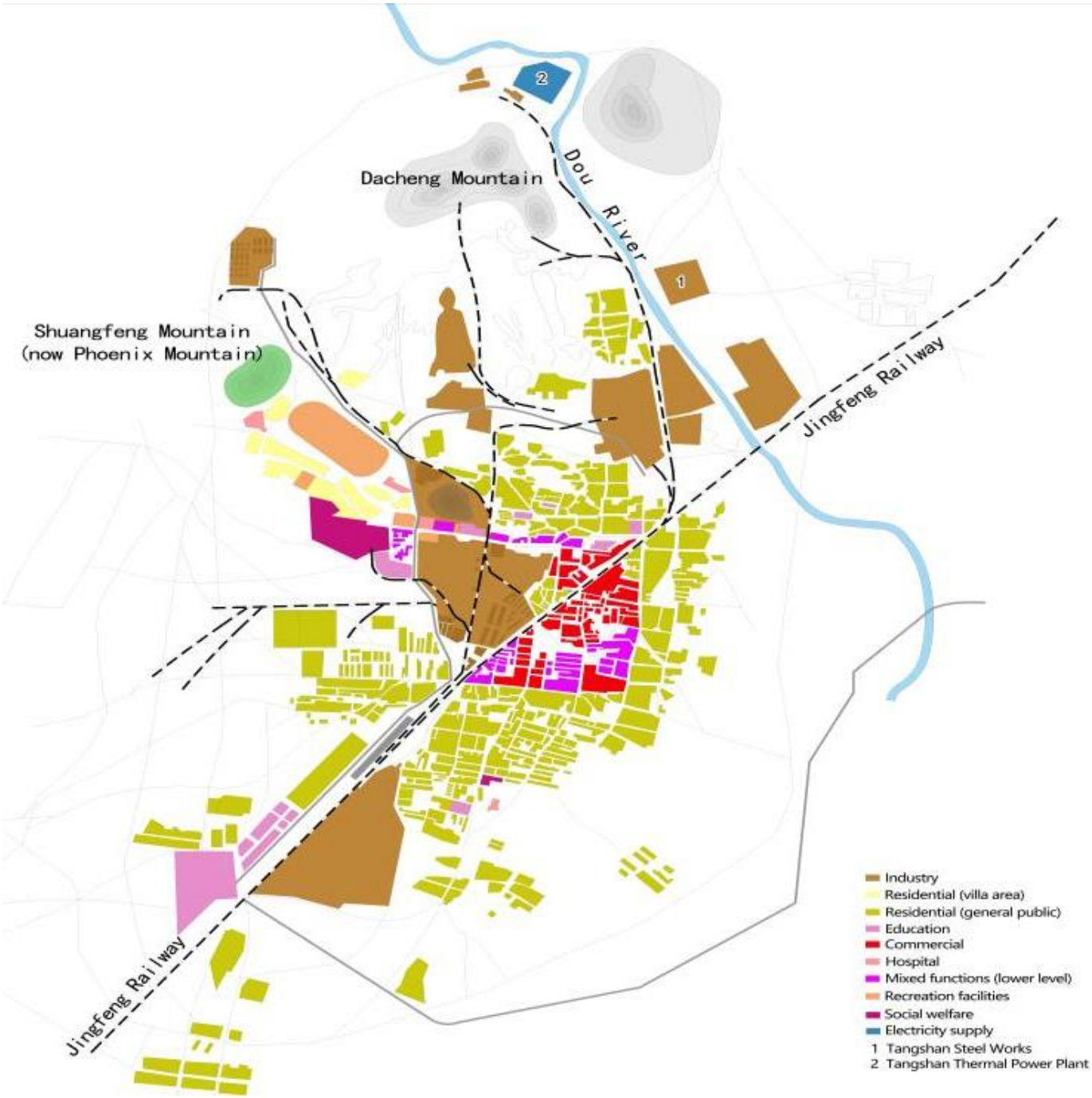

Figure 4: Spatial pattern of the city and location of key construction projects between 1935 and 1948

Table 1: Characterization of the evolution of urban spatial patterns

historical staging	1876-1907	1907-1935	1935-1948
The development process	The initial stage of modernization	Concentration stage of modernization	Wartime, post-war slow development phase
Major construction projects	Industrial, railroad, residential, recreational, commercial, medical, educational	Residential, industrial, commercial, educational, infrastructure, railroad extension, social services	Industry, infrastructure
Spatial evolution			
Construction Features	At the early stage of urban development, due to abundant land resources, urban spatial development is not limited, relying on the Kaiping Mining Bureau and the railway station to build on demand, group layout, forming an early city center	With the rapid expansion of urban space, the land resources in the center are reduced, and urban construction is seamless and continues to expand along the center to the periphery, and the clusters are gradually connected to form a piece.	Fewer construction projects due to the impact of the war and the need to unclog and channel the problems left over from the pre-construction period of the city

2.2 Urban Space Issues

2.2.1 Disorderly spatial expansion of cities

Tangshan in modern times in the process of urban space expansion, there is obvious spontaneity, did not first formulate the law of urban development in line with the spatial planning, there is no unified planning and management department, the construction project site selection lack of unified consideration of urban space to the Mining Bureau and factories as the center of the gradual outward expansion, the government, enterprises, businessmen, individuals and other different interests of the main body to buy land in accordance with their own needs at will to carry out the construction, resulting in The expansion of urban space is free and disorderly.

2.2.2 Mixed functional zoning

During the development of modern Tangshan, although various urban functions were gradually formed, there was no obvious zoning between the functions. Industrial areas were located according to the distribution of resources and the convenience of production and transportation, and were distributed in a point-like manner, without a centralized layout. Residential areas were distributed around the factories and mixed with the industries. The commercial area is built on the basis of the mining area, located around the train station, and has no obvious boundary with the residential area. Educational, medical and social service facilities are scattered within the city, and the functional zoning is disorganized.

2.2.3 Irregularity in the spatial layout of buildings

The architectural style of modern Tangshan is mixed, with buildings of different scales, forms, densities, heights, and qualities cross-layout without regularity. Most of the buildings in ordinary residential areas are low bungalows, with narrow and simple buildings, chaotic texture, and extremely high building density, even up to 70%-80% [14]; most of the industrial buildings are factory buildings with large scale; and the transportation university, villa area, railway station, and part of the commercial buildings are multi-storey western-style buildings, and although these building units have been designed, there is also a lack of echoes between different units (Figures 5 and 6) [15].

Figure 5: Kailuan Tangshan Mine in 1942

Figure 6: A corner of Tangshan in the 1930s

2.2.4 Disorganized road system

The Jingfeng Railway divides the city, and the railroad branch lines directly connect the interior of various industrial and mining enterprises, blocking traffic and making the road

structure inside the city, especially north of the railroad, confusing and inconvenient for urban access. Only a few of the roads inside Tangshan were built directly, such as Xishan Road and the road between the old and new factories of Qixin, etc. Most of the roads were formed naturally, with the buildings constructed first, reserving space for passage and forming the roads, and only a few of the naturally-formed streets and alleys are straighter and have a clear texture, for example, Qiaotun Street, Xiaoshan Street, Xinli Street, Dongxin Street, and Gouxinandong North Street. In general, the road system within Tangshan is not planned, and the streets are narrow, winding and structurally confusing.

3. Factors Affecting Urbanization

3.1 Abundant Resources as a Basis for Rapid Urban Development

Tangshan's ability to seize the opportunity of the foreign affairs movement to rise rapidly was ultimately due to its abundant natural resources (Figure 7). Tang Tingshu emphasized that the quality of coal was the most crucial factor in the success of coal mines, and at the beginning of its development, Tangshan's high-quality and abundant coal resources drove the rise of the city. In addition to coal resources, Tangshan also utilized limestone, refractory clay, iron and other resources to develop industrial industries such as cement, ceramics and iron and steel, which enriched Tangshan's industrial categories, influenced the spatial layout of the city, and propelled the city from a small agricultural village with farming as the mainstay, to a resource-exporting city of a single category, and then to gradually develop into a fully-functional industrial city, realizing the great change in the city's functions.

3.2 Good Location and Accessibility are Prerequisites for the Rapid Emergence of Cities.

At that time, sea transport gradually replaced river transport as the main mode of transportation. In 1860, after the signing of the Treaty of Beijing, Tianjin opened its port and gradually transformed itself from a traditional city into an economically developed industrial and commercial city, surpassing Beijing and leaping to become the economic center of the north. Tangshan, located on the Bohai Sea coast, was closer to the Tanggu port than any other coal mines built at the time, and had the advantage of good currency exchanges. The proximity of Shanghai, Yantai, Weihai, Qingdao, and other cities made it easy to carry out maritime transportation to transport materials, machinery and equipment, and industrial products. Initially, the Kaiping Mining Bureau relied on Tianjin for financial support for its establishment, transportation of machinery, transportation of coal, and sale of coal, and was a coal-producing town affiliated with Tianjin. After the completion of the Jingfeng Railway, Tangshan opened up the transportation links with the Northeast region, so that Tangshan and many cities along the route have established transportation links to achieve industrial and commercial trade exchanges, this period, although still need to get Tianjin's support, but has begun to develop independently. The construction of the Kailuan Marine Transportation made Tangshan and Shanghai, Guangzhou, Hong Kong and other southeastern coastal cities also realized material exchanges, which further promoted the development of Tangshan. In the process of development, Tangshan built the Qinhuangdao port and railroad, which promoted the modernization of Qinhuangdao and led to the development of the region, achieving a significant improvement in the status of the region [16] (Figure 8).

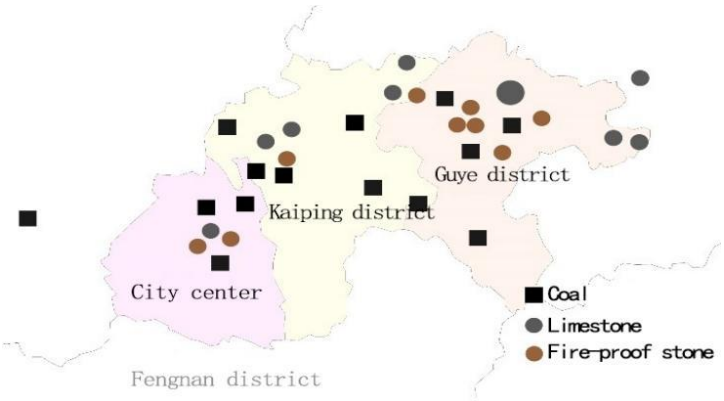

Figure 7: Tangshan Resource Map

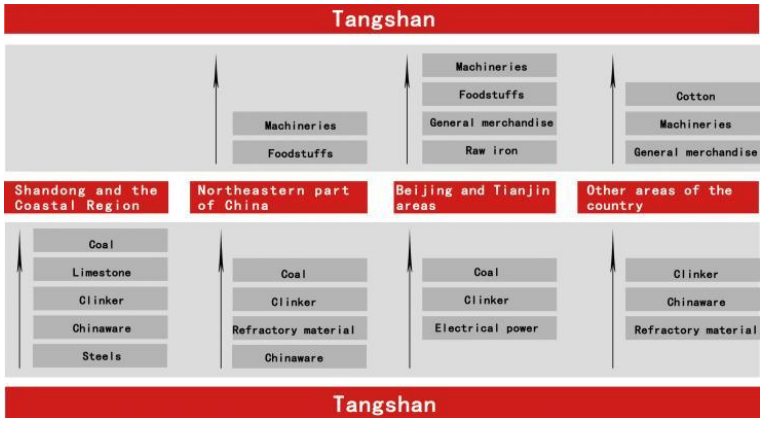

Figure 8: Map of trade relations between Tangshan and the region

3.3 Scientific and Technological Talent as a Key Driver of Urban Development

3.3.1 Talent acquisition

In the process of modernization, Tangshan continuously introduced western talents and science and technology. Adoption of Western method has built coal mines, cement factories, ceramic factories and other modern industrial and mining enterprises, but also the construction of railroads and other ancillary facilities. Tang Tingshu had hired a number of British engineers to assist in the construction of coal mines; British engineers Jinda on the construction of railroads, railroad factories and the establishment of the University of Transportation have played an important role in promoting; German engineers Hans Kund on the construction of Kaixin ash company development has provided strong technical support. Engineers from different countries not only provided technical assistance to many large-scale industrial and mining enterprises in Tangshan, but also influenced the urban pattern of Tangshan because of the introduction of different cultural practices, forming urban spaces such as villa districts, racecourses, clubs and hospitals, accelerating the construction of urban supporting facilities, and giving rise to different architectural styles and enriching the urban spatial pattern.

3.3.2 Talent development

In the process of Tangshan's development, the higher education schools founded by various industrial and mining enterprises cultivate scientific and technological talents according to the demand, and the teaching involves surveying and mapping, mining, metallurgy, transportation, machinery, civil engineering, medical care, water conservancy and other aspects. Schools located in Tangshan, on the one hand, to facilitate visits and internships, so that students' learning and practice combined, is conducive to the cultivation of talent, and promote the further development of enterprises; on the other hand, enrich the functional space of the city, enhance the status of the city, for the further development of the city to provide support for the talents. Especially Tangshan Jiaotong University, the predecessor of Southwest Jiaotong University, has had a profound influence on the industry until now (Table 2).

Table 2: Tangshan Higher Education and Vocational Education Schools

Name of educational institution	Founding organization	Purpose of establishing the school	main field of study (at university)
Tangshan Jiaotong University	Jingfeng Railway Bureau	Developing talent in railroads	Railroad Engineering
			structural engineering
			hydraulic engineering
			Municipal sanitation works
			Mining Section (later discontinued)
Kailuan Senior Nursing School	Kailuan Mining Bureau	Trained nurses for Kailuan Hospital	physiotherapists
Majiagou Surveying and Mapping Academy	Beiyang Luanzhou Government Mining Company Limited	Developing Talents for Luanzhou Coal Mine	English
			survey and draw
			calculus, etc.

3.4 Rapid Population Growth as an Important Guarantee of Urban Modernization

Before entering modernization, the neighborhood of Qiaotou Tun was sparsely populated, and as Tangshan continued to develop, the population increased rapidly (Table 3). In addition to the early residents of Qiaotou Tun, some foreign residents were also introduced. Tang Tingshu brought in a large number of skilled workers from Guangdong who had used machines, and later Shandong laborers also entered Tangshan. The influx of Guangdong and Shandong laborers promoted the urban construction of Tangshan, and due to the regional differences and customs, streets with regional characteristics were formed, such as Guangdong Street, Xiaoguangdong Street and Xiaosandong Street, and the Guangdong Huijiaguan (Hall of Canton) was also constructed, Shandong Association Hall and the British Association Hall, which served as places for exchanges and activities of fellow villagers. In addition to Cantonese and Shandong people, the main residents of Tangshan were also farmers from the surrounding areas. The rapid development of Tangshan brought many job opportunities, attracting farmers from the surrounding areas to work and settle here during their leisure time; with the construction of the railroad, the city's commercial development further attracted a large number of merchants, handicraftsmen, and artists to come to Tangshan, and the size of the city's population grew further, and the occupational categories became more and more diversified. According to the statistics of the police department, in the fall of 1926, the total number of households in Tangshan reached 10,342, with a total population of 47,623, of which the foreign population was the largest, with 44,853 people, accounting for 94.2% of the total population. The local population was smaller, accounting for 5.3% of the total, with a small number of foreigners (Table 4). The large influx of foreign population has accelerated the development of the city's residential, industrial, commercial, educational, medical, and recreational facilities, and has energized the city [17].

Table 3: Statistical Table of Tangshan's Population Size in Modern Times

Period of Time	Size of Population	Clarification
1876	More than 100 people	Traditional inhabitants of Qiaotou Tun village
1878	more than 3,000 people	More than 3,000 workers assembled by Tang Tingshu to excavate coal mines
1926	More than 50,000 people	Statistics of the Police Department in 1926 (Source: Tangshan's Recent Economic Situation)
1949	More than 140,000 people	Statistics on the eve of the founding of New China

Table 4: Table of Statistical Composition of the Population of the Tangshan Police Department, Fall 1926

Form	Total Number of Households (households)	Percentage of Households (%)	Total (persons)	Number of Persons as a Percentage (%)
Total population	10342	100	47623	100
foreign population	9985	96.5	44853	94.2
local population	305	3.0	2534	5.3
foreigners	52	0.5	236	0.5

4. Exploration of Modern Urban Planning Ideas

The modern era is a stage of intense collision between Chinese and Western urban planning ideas. Influenced by western science and technology, and differentiated from the planning theory of traditional Chinese city camping, the city, in addition to the traditional functions of politics, commerce, agriculture, and residence which are easy to integrate in terms of space and scale, has also produced new architectural forms and urban spaces, especially the development of modern industry, which has compelled the city to change the traditional pattern and search for a new equilibrium. Tangshan, as an industrial city developed by natural resources and external transportation, distinguishes itself from traditional cities. During its development, China's local urban planning forces have actively explored the city, and although many problems have been left behind in the construction process due to a lack of experience, some new planning ideas have been formed.

4.1 Gradual Acceptance of New Industries

The main purpose of the foreign affairs movement is to "learn from the barbarians to control the barbarians", at this stage, China's learned people have initially recognized the importance of industry and science and technology to the country, with agriculture and handicrafts as the main self-sufficient natural economy can no longer adapt to the development of society, the use of science and technology to develop industry and commerce is the new way out.

4.2 Location of Resources Determines the Location of Cities

In contrast to the traditional Chinese theory of city planning and construction, "feng shui" is no longer the main criterion for the location of a city, and natural resources have gradually become an important factor in the selection of a city's location. Tangshan's major industrial and mining enterprises are located close to natural resources such as coal, limestone, iron, refractory clay, water, etc., and the city is built and developed around these industrial and mining enterprises. The distribution of industrial resources determines the location of industrial and mining enterprises, and the location of industrial and mining enterprises determines the location of cities.

4.3 Replacement of Canals by Railroads as the Lifeblood of Transportation

In the process of figuring out urban planning, the transformation of canals into railroads as an important transportation lifeline was another major attempt by China to gradually accept Western planning ideas. Initially, the Coal River (Link Canal) was used as the main transportation artery, and then it was gradually abandoned. Tang Tingshu presided over the construction of China's first standard-gauge railroad as Tangshan's main external transportation route, which was later extended outward to become the Beijing-Fengshan Railway, connecting different regions, which not only enhanced transportation efficiency and saved transportation costs, but also had a significant impact on the location of industrial and mining enterprises and the spatial layout of the city.

4.4 Co-development on a Regional Basis

In ancient China, the concept of co-development and intercommunication between different cities has always been present in city construction, whether it is the deployment of military towns or trade exchanges between commercial towns, the planning concept of co-development can be reflected. In the course of Tangshan's development, this planning concept has gradually become clear, the most obvious manifestation is the interdependence between Tangshan, Tianjin and Qinhuangdao, each with its own advantages, and drive each other's relationship, the city and the region can be influenced by each other, promote each other, and realize common development.

4.5 Integration of Colonial Planning and Urban Development

The concepts of functional zoning and optimization of the road pattern were clearly mentioned in the "urban plan" formulated during the Japanese occupation of Tangshan. These two aspects were the least taken into account in the modern urban construction of Tangshan, and thus caused problems for the subsequent development of the city. Although this plan is flawed and not fully implemented, the planning ideas in it are a reference for the development of modern urban planning theory in China.

5. Conclusion

Affected by the earthquake, Tangshan's buildings in the modern period were mostly destroyed, and the street texture has also undergone many changes, which brought great inconvenience to this study. In addition, due to the limitation of space and information, this paper is still insufficient in the process of urban construction in modern Tangshan, the optimization of the urban space after the earthquake, the alleviation of the urban functions, and the study of urban transformation and development, and it is hoped that more scholars will take part in this research in the future.

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