

A Study on the Spatial Structure of Jinan in the Qing Dynasty

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Abstract

Taking Jinan as the research object, this paper attempts to construct the spatial structure of Jinan in the Qing dynasty through documentary research and historical map transfer. The study was conducted on the following three levels: macro, meso and micro. Specifically, in macro-level, the study attempted to construct the spatial structure by sorting out the natural environment and transport elements, Qing dynasty administrative divisions and urban functions within the city limits. In meso-level, the study focused on the interaction of mountain and river with urban siting and urban axes. In micro level, the study focused on the organisation of space within the city. The study found that the eight counties within the city limits of the Qing Dynasty were all centres of defence, political, economic, cultural, and educational functions, together forming a multi-centre network structure. Among the 8 counties, Licheng County was located between mountains and rivers, and used the natural elements to establish an effective defence system. The city formed five main axes with the mountains and rivers, creating a harmonious and close connection with the surrounding environment. Inside the city, the space was organised through *lishi*, forming a spatial structure with the north-south road as the skeleton. By establishing the spatial structure of the entire administrative region and its multiple layers, the study hopes to provide historical advice to current planning practice.

Keywords

urban planning history, Jinan, China, the Qing Dynasty, spatial structure.

How to cite

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INTRODUCTION

Jinan is the provincial capital of Shandong, China. As a mega-city, Jinan is an important city on the Yellow River Basin Economic Belt. There were human activities in Jinan 4000 years ago. People have built cities here for more than 2000 year. Planning studies on Jinan have accumulated a wealth of results in recent years. It covered the history of modern urban planning,¹ modern urban form,² spatial structure,^{3,4} the relationship between ancient city and water system,⁵ etc. However, the existing studies focused more on the central city and less on the entire administrative region; more on artificial space and less on natural environment; more on the modern times and less on the ancient times. According to the current urban and rural planning regulations, the main subject of planning is the 'city established according to the administrative system', and the spatial structure includes both artificial space and natural space such as topography and water patterns. Therefore, this paper intends to recognize the spatial structure of Jinan from the whole city. It is developed at three levels: macro, meso and micro.

SPATIAL STRUCTURE IN MACRO LEVEL

At the macro level, the study covered the entire area of Jinan, with an area of approximately 10244.45 km². The macro-level study was divided into three steps. The first step was to sort out the natural environment and the distribution of land and water traffic within the study area. It provided the background and foundation for subsequent studies. The second step was to sort out the administrative divisions within the study area of the Qing dynasty based on the data in the China Historical Geographic Information System (CHGIS). The third step was to sort out the functions of the counties within the study area. Based on the analysis of the above three steps, the article refined the spatial structure at the macro level.

DISTRIBUTION OF NATURAL AND TRANSPORT ELEMENTS

The development of cities is closely linked to the physical and geographical environment, and cannot be separated from the favourable conditions provided by the environment, but is also subject to various constraints imposed by the natural environment. The natural environment is a non-negligible element of the cognitive spatial structure, and the two interact and influence each other. Jinan located in central Shandong Province. The general topography is characterised by high terrain and rolling hills in the south and low terrain and wide plains in the north (Figure 1). Before 1854, the ancient Jinshui River (later called the Daqing River), ran through the city from southwest to northeast. The tributaries on the south bank of the Jinshui River are well developed, and the water flowing from the mountainous area in the middle of the province is cascading into the Jinshui River through the floodplains in front of the hills. Tributaries at all levels are interwoven and dense as a network, facilitating the development of navigation and irrigation.

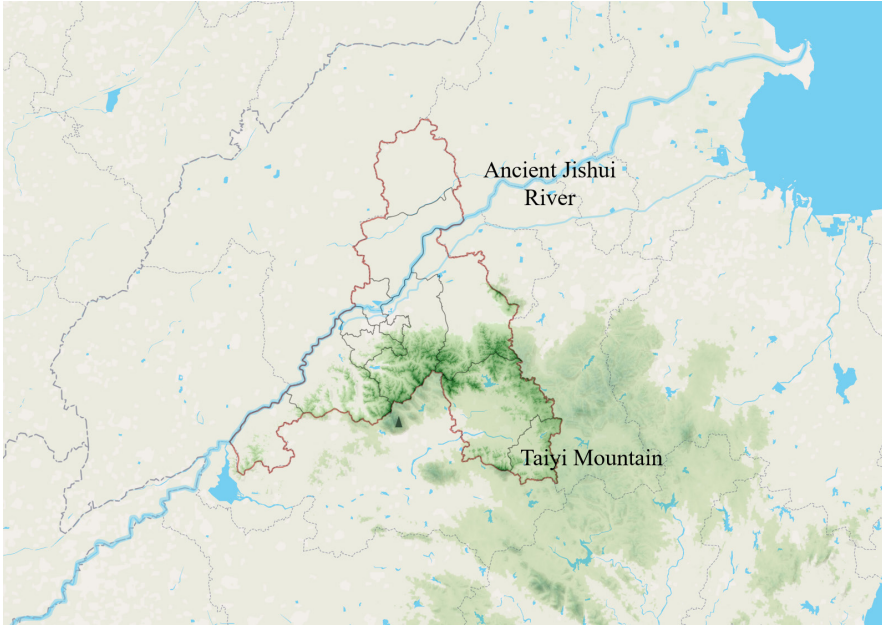


Fig. 1. Jinan's location and surrounding natural environment

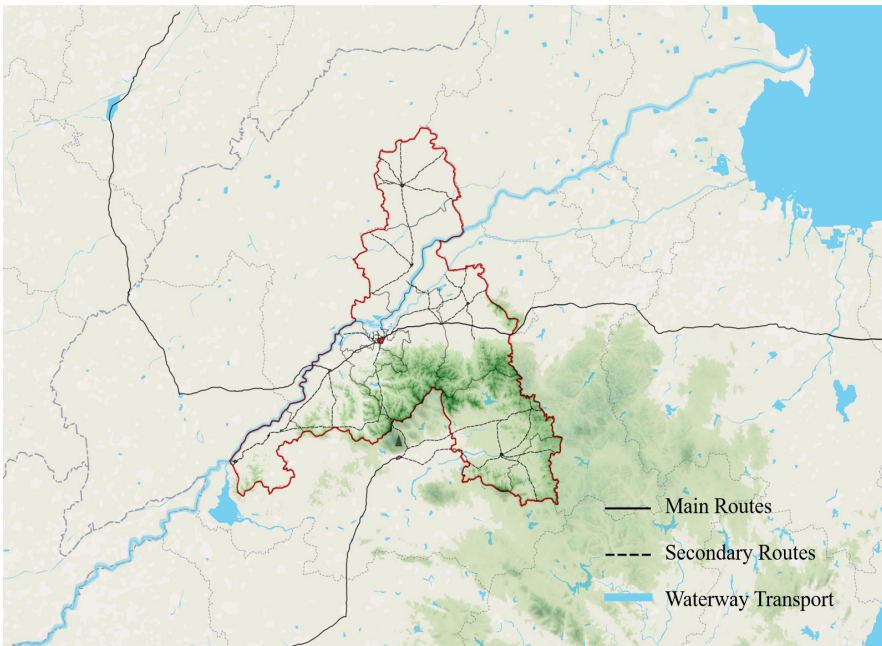


Fig. 2. Distribution of water and land transport routes

Water and land transport were important pillars in the emergence and development of the city. The first step in sorting out the distribution of water and land transport was to collate the relevant records in the literature. At the same time, Map of Chili and Shantung (Karte von Tschili und Schantung) by Prussian Royal Land Survey was aligned in GIS to extract the transport elements from it. A comprehensive distribution of water and land transport is obtained by cross-checking documentary records with historical maps. According to Hou Renzhi's research, there was a long-established east-west road along the northern foot of the Luzhong Mountains. This avenue sprouted at the end of primitive society and developed significantly in the Zhou Dynasty, and had been the artery of communication and economic connection between the Central Plains and Shandong Peninsula since ancient times.⁶ In terms of regional transport, there was also the official horse road passing south from the capital to Jiangsu, Zhejiang and Fujian. In addition to the two main land transport routes mentioned above, there were a number of link roads within the city. They linked the various counties within the municipality and formed a dense network. In ancient times, freight was mainly carried by water, and the inland waterways were of great importance. The waterways of Jinan were also relatively well developed in historical times. The ancient Jishui River mentioned above was the main artery for east-west water transport in the Central Plains. In Song Dynasty, Liu Yu presided over the excavation of the Xiaoqing River, which guided the springs in Jinan to flow eastward into the sea, complementing the Daqing River as the main channel for transporting sea salt.

The development of land and water transport over the ages based on the natural geography has resulted in an intermodal transport system within the city, making the site a regional water and land transport hub.

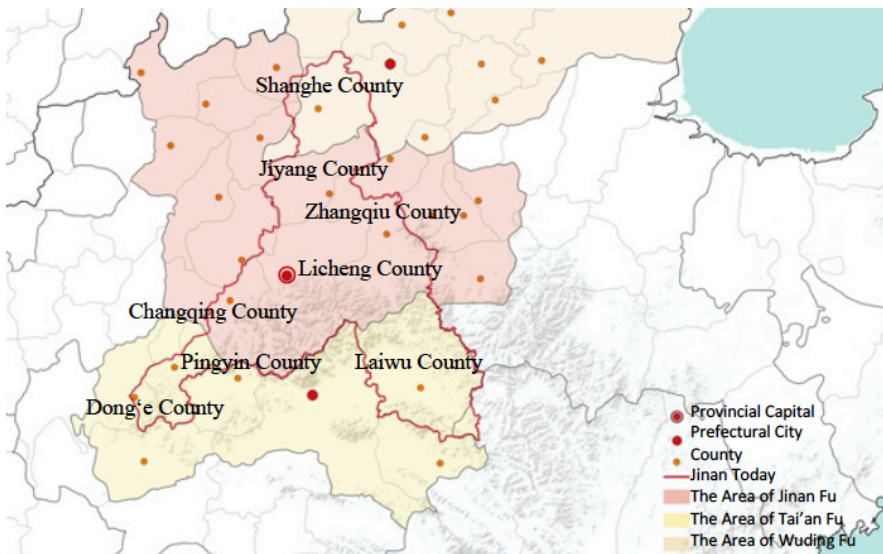


Fig. 3. Administrative divisions of Jinan in Qing Dynasty

ADMINISTRATIVE DIVISIONS OF JINAN IN QING DYNASTY

Although administrative zoning and urban planning are two completely different concepts, they are very closely related. During the Qing Dynasty, there was a three-tier administrative division of 'province - fu - county'. The administrative division that corresponds to today's municipalities is the 'fu'. The area of the Jinan Fu during the Qing dynasty was not identical to the area of Jinan today (Fig. 3). Parts of the area under the jurisdiction of Jinan Fu in Qing dynasty is no longer part of Jinan today (east and west side). At the same time, the northern, south-eastern, and south-western parts of the city of Jinan today also extend beyond the boundaries of the Jinan Fu in the Qing dynasty. The specific administrative divisions within the municipality are as follows.

During the Qing Dynasty, Shandong Province was divided into 12 administrative units at the Fu level. Jinan Fu was the provincial capital. The area of Jinan today was belonged to three prefectures in the Qing Dynasty, from north to south, namely Wuding Fu, Jinan Fu and Tai'an Fu. The capital, Jinan Fu, had 16 counties, and was governed by Licheng County. Of the 16 counties under the jurisdiction of Jinan Fu, three have their centres and county boundaries within the city limits, namely Licheng, Jiyang and Zhangqiu counties. In addition, the centre and most of the Changqing County are within the city limits. To the north lied the Wuding Fu, which had jurisdiction over 10 counties. The centre and most of the Shanghe County, which was under the jurisdiction of Wuding Fu, lies within the city limits. To the south was the Tai'an Fu, with six counties under its jurisdiction. Laiwu County, which was under the jurisdiction of Tai'an Fu, are within the city limits, and the centres and partial of Changqing County and Dong'a County are within the city limits. Thus, today's Jinan city district contains a total of 8 counties.

To sum up, the area of the city of Jinan today belonged to three administrative districts during the Qing Dynasty. The main body and centre have not changed significantly. The centres to the north, south-east and south-west of the study area were not within the regional boundaries.

FUNCTION OF THE COUNTIES DURING QING DYNASTY

The city maps of the eight counties in their respective county annals were collected, in the first step, to identify and extract important information. This was followed by further combing through the county annals for the form and size of the county, and compiling the above information into the table (Table 1).

The study shows that all eight counties were with walls, and that the shape of the city was square (3), rectangular (4) and circular (1). The walls generally had a gate in each of the four directions, with a few gateless in one direction due to the natural environment. A few other counties had two gates on one side of the wall, as in the case of Pingyin County. The walls were mostly three to four li⁷ in circumference, with Zhangqiu County being slightly larger at 6 li, and Jinan Fu, the largest provincial city, at 12 li. Further combing the layout of the main buildings in the city, the counties were all laid out with a ruling house, Confucius' Temple,

and Town God Temple. Combining the above information on the form, scale, and functions of the cities, all eight cities within the municipal area were all centres that combined military defence, political, economic, cultural, and educational functions.

The macro-level spatial structure was constructed by sorting out the natural environment & transport elements, administrative divisions, and the functions of counties (figure 4). As mentioned above, all the counties within the study area were centres with a full range of political, military defence, cultural, educational, and economic functions. As the capital of Shandong Province and the prefecture of Jinan, Licheng County was located at the hub of land and water transportation, and the city was equipped with government offices at all levels, making it a first-class centre in the region. Wuding prefectural city and Tai'an prefectural city were the secondary centres in the region. Secondary centres were not within the scope of the study, but were immediately adjacent to it. At the same time, they were the centre of some next level nodes and had a direct influence on the object of study. The counties were the third-tier centres in the region. The different levels of centres together with the transport routes formed a complete network structure.

Name of the County	Shape	Form of the City Walls	Scale (Circumference)	Key Buildings
Licheng County	App. Square	4 gates. The east gate, south gate, west gate were equipped with um city	12 li, 48 zhang (6160m)	Government(provincial, prefecture and county level), Confucius' Temple, Xianxue ⁸ , Town God Temple
Jiyang County	App. Rectangular	3 gates (no gate on the south side). With um.	4 Li (2000m)	County Government, Confucian Temple, Xianxue, Town God Temple
Zhangqiu County	Rectangular	4 gates. All with urns.	6 Li (3000m)	County Government, Confucian Temple, Town God Temple
Changqing County	Rectangular	4 gates. No urns.	4 li (2000m)	County Government, Confucian Temple, Xianxue, Town God Temple
Shanghe County	App. Circle	Double walls. Both had 4 gates. No urns.	Outer: 9 li Inner: 535 zhang (4500m, 1783m)	County Government, Confucian Temple, Town God Temple
Laiwu County	App. Square	3 gates (no gate on the north side). No urns.	3 li (1500m)	County Government, Xianxue, Town God Temple
Pingyin County	Square	5 gates (2 gates on the south side). No urns.	625 zhang (2083m)	County Government, Confucian Temple, Xianxue, Town God Temple
Dong'e County	App. Rectangular	5 gates (1 gate on the southeast side)	4 li, 59 zhang (2195m)	County Government, Confucian Temple, Xianxue, Town God Temple

Table 1. Shape, Form, Scale and Key Buildings of 8 Counties

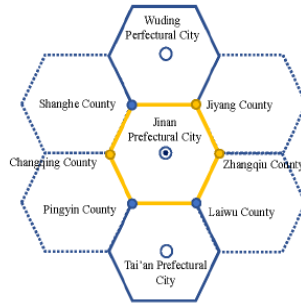


Fig. 2. Macro level spatial structure.

SPATIAL STRUCTURE IN MESO LEVEL

As the seat of the Jinan Fu's government, Licheng County was the centre of Jinan Fu during the Qing Dynasty. It is also the centre of today's Jinan, and the main physical carrier of the city's historic district. Therefore, the spatial structure at the meso level, with the county of Licheng as the object of study, focused on the structure established between the county and its surrounding natural environment. Relying on the principles of ancient city planning and construction, this section explored the spatial structure at the meso-level, starting with the selection of sites, orientations, and axes.

THE CITY LOCATED BETWEEN MOUNTAINS AND RIVERS, AND USING NATURE ENVIRONMENT TO BUILD EFFECTIVE DEFENCES

The location of the ruling city was based on the principle of 'between the mountains and water', which means that the city tends to choose a unique situation surrounded by mountains and water. The large-scale topography on which Licheng County sited conformed to this principle. The mountains range to the south were continuous, forming an encirclement with the peaks on the edge of the hilly mountains to the east and west. Together with the ancient Jishui River boundary to the north, this formed an ellipse that was long from east to west and short from north to south, with the county at the exact centre of the ellipse (Figure 5). In addition, the city also used natural elements to establish an effective defence. From a regional perspective, there were two routes from the Central Plains to the Jiaodong Peninsula, south and north, due to the intervening Taiyi Mountains. The geospatial situation of these two paths was very different. The southern route was along the Huanghuai Plain. The rivers along the route were dense and perpendicular to the direction of advance and had wide channels. As a result, there were more sections that form serious obstructions and the space was divided into multiple levels⁹. The northern route was along the northern foothills of the Taiyi Mountains. On this route, only the intersection between Taiyi mountains and Jishui River was easy to form effective defence. The city was in the middle of this channel, behind the river, and took advantage of the ancient Jishui River and the Taiyi Mountains to form an effective defence.

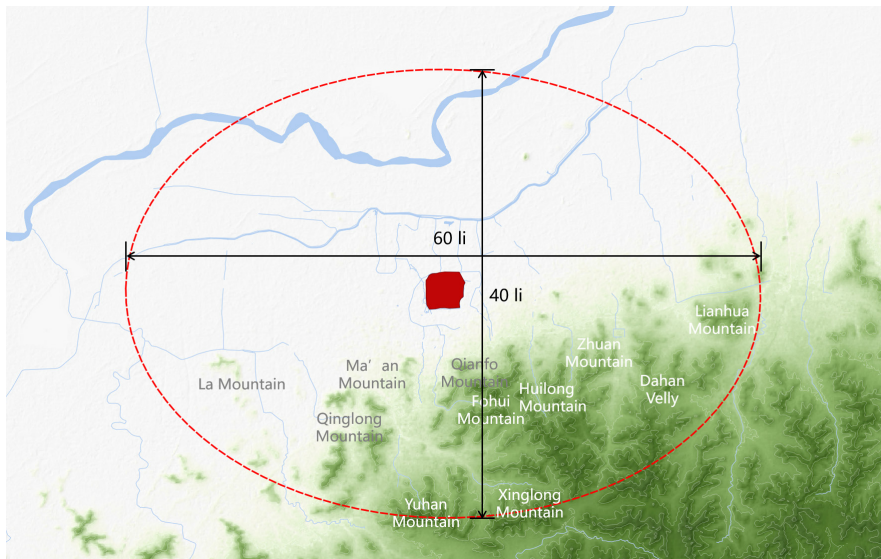


Fig. 3. The principle of urban cite selection.

TAKING THE SURROUNDING NATURAL ENVIRONMENT AS A REFERENCE FOR THE URBAN AXIS

In ancient times, cities paid special attention to the choice of orientation. The orientation of the city's main roads and gates, as well as the orientation of the main official buildings, were of great concern¹⁰. The basic principles and methods for establishing orientation were geographical orientation or mountain and river orientation. Geographical orientation means facing in the positive north-south direction, while mountain and river orientation are selectively aligned with the peaks of the mountains or the gates formed between the peaks. Through these two methods a strong connection was established with the surrounding natural environment. By sorting through the surrounding natural elements and aligning the historical maps in GIS to obtain the location of the gates and the direction of the main roads, it was found that the city established a basic structure with its environment through four main axes (Figure 6). The South Gate was positioned slightly to the east, facing south-west, with Qianfo Mountain and Ma'an Mountain as gateway, eventually pointing towards Yuhan Mountain. The eastern gate was positioned to the north, facing north-east, and was gated by two peaks on the edge of the hilly mountains. The west gate was positioned to the south, facing south-west, and pointing towards La Mountain. The North Gate was positioned to the east, pointing towards the turn of Jishui River, and took the two mountains of Que and Hua as its gateway.

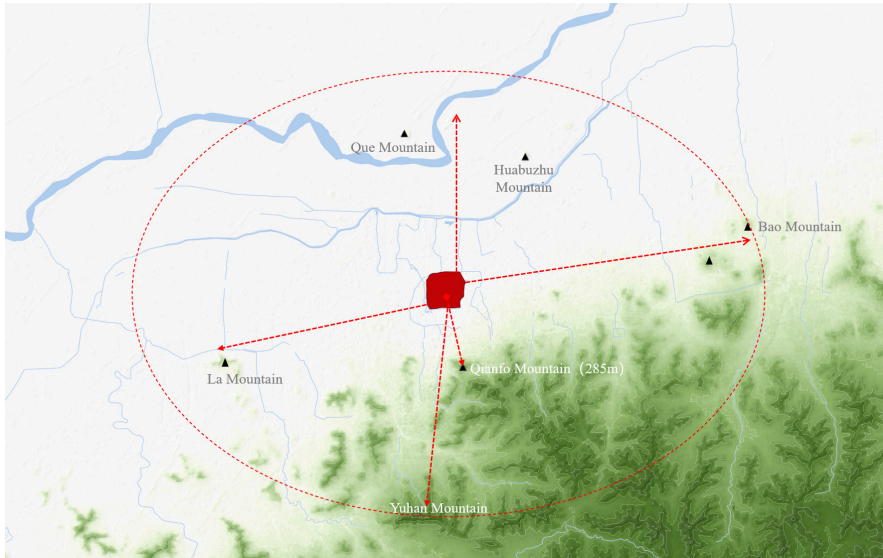


Fig. 4. The orientation of city's main road and gates & the orientation of the main building.

The orientation of the main buildings in the city followed the same principle of facing the mountains and rivers. In Ming Dynasty, the prince's residence was a complex of buildings second only to the emperor's palace. Local officials were required to visit the prince's residence on a regular basis, and the prince was required to officiate at the main rituals in the city, accompanied by local officials. In Ming Dynasty, there was a Prince's Residence in Jinan. With its enormous size and symbolic significance in terms of regulation, the residence occupied a central position in the city and was the ceremonial centre of the Jinan during the Ming dynasty. After the destruction of the residence in the Qing dynasty, its former location continued to be used as a governor's office, with its symbolic significance and ritual status having continuity. There was a clear central axis in the group, with the axis pointing slightly south-east in a non-positive direction, towards the Qianfo Mountain outside the city.

SPATIAL STRUCTURE IN MICRO LEVEL

The micro-level research object was the area within the city walls. In order to analyse and extract the spatial structure within the city, the records on the zoning and administration of the city in the county records were combed and translated into historical maps. According to the Licheng County Chronicles (Licheng Xianzhi), the area within Licheng County was organized through "lishe". The city was divided into 8 lishe, which were: Xin, Wen, Xiao, Fa, Di, Roumei, Zhong, and Heli, and each lishe contained 5-8 streets (Table 2). The streets were divided into 'Pai', under which specific households and populations were governed. As a result, the town was organised as a "community - street - household - population". This structure was from top to bottom and detailed to the individual.

Name of Lishe	Streets/Alley included	No. of Pai Under Jurisdiction	No. of Households	Population
Xin	Xianqian Street, Xixian Alley, Dongxian Alley, Cang Alley, Yinjia Alley, Ancha-Si Street, Pangong Alley, Zhenying Alley	85	866	3779
Wen	Dongmen-Li Street, Dong-Qianggen Street, Miaojia Alley, Gaoqiang-Hou Street, Bei-Qianggen Street	48	498	1510
Xiao	Nanmen-Li Street, Kuanhousuo Street, Lishanding Street, Madao Street, Shunmiao Street, Fuao Street, Dehua Alley, Caishen Alley	79	796	3697
Fa	Bangpeng Street, Wei Alley, Niutou Alley, Junmen Alley, Shualv Alley, Dong-Yuanmen Alley	78	799	3591
Di	Xi-Yuanmen Street, Tiandi-Tan Street, Gebo Alley, Furong Street, Buzheng-Si Street	76	778	3675
Roumei	Ximenli Street, Nanchenggen Street, Jiuqu Alley, Gaodusi Alley, Bianzi Alley	78	799	2985
Zhong	Houzaimen Street, Yunlu Street, Fuxue Street, Yuanxi Street, Xi Gongxie, Quehua Street, Yuanhou Street, Bell Tower Temple Street	97	984	3922
Heli	Beimenli Street, Er Lang Temple Street, Huibo Temple Street, Chayuan Street, Huqianhu-Jing Alley, Shihui Alley	59	597	2787

Fig. 5. Details of organisation within the city.

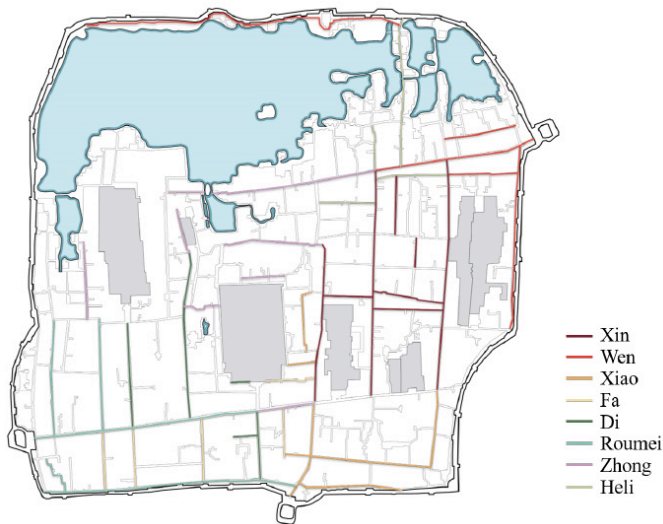


Fig. 6. Spatial structure of the internal Licheng city.

In order to extract the spatial structure of the city, the records of *lishe* were transferred to a historical map. As can be seen from the figure (figure 7), nearly a third of the northern side of the city was covered by Daming Lake. In addition, as a provincial capital, many government offices gathered in the city, occupying important positions in the city. Apart from the above elements, the city formed a spatial structure with roads, especially north-south roads, as the skeleton.

CONCLUSION

Based on the above analysis, the spatial structure at different scales within the administrative region of Jinan during the Qing dynasty was constructed. At the macro level, a polycentric network structure has developed within the city. There were 8 centres of different levels in the structure, including 1 first-level centre and 7 third-level centres. The superior centres of three third-level centres were not within the study region. It was therefore characteristic of macro-spatial structure that some of the nodes were not centripetal. At meso level, the prefectural city, Licheng County, located between mountains and rivers, and using nature environment to build effective defences. At the same time, the choice of the main urban axes followed the principle of 'mountain and river orientation', creating a harmonious and close connection with the surrounding environment. At the micro level, the city was organised through the *lishe*, which formed an organisational structure of '*lishe* - streets - households - population'. And the city has formed a spatial structure with north-south streets as the main skeleton.

Urban development is a continuous process, with the past, present and future in the same chain of time. By summarising past planning practices, urban planning history and theory research provides historical advice and practical insights into current planning practices. As China's planning system is currently undergoing major changes, research on urban planning history should also actively expand the scope of the research objects and perspectives. While previous studies of planning history have focused on central urban areas, this paper aims to extend the focus to the entire administrative area, integrating urban and rural areas, man-made and natural, while exploring new research paradigms. It also seeks to understand the history of urban planning in a holistic and multi-layered manner, to find experience in history, and to provide a basis for the preservation of urban heritage.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the author.

NOTES ON CONTRIBUTOR(S)

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ENDNOTES

1. Li, "A Study on Jinan's," 50.
2. Wang, Morphological Development.
3. Zhao, "Structure Research," 90.
4. Meng, Transition and Development.
5. Yang, Water System and Spacial Form.
6. Hou, Theory and Practice.
7. The 'li' and the 'zhang' are ancient Chinese units of length, and 1 li equals 150 zhang. 1 li equals 500 metres.
8. 'Xianxue' was a kind of school run by county government.
9. Wang, "Nature of Yuchisi," 41.
10. Sun, "Traditional Planning and Methods," 99.

IMAGE SOURCES

All images drawn by author