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Research on Chongqing's Urban Competitiveness Guided by Becoming an International Metropolis

Xiao-Yu TANG[a,*], Yuan FU[b] and Gui YE[c]

School of Management Science and Real Estate, Chongqing University, P.R.China,

[a]t2612881@163.com, [b]826226739@qq.com, [c]yegui760404@126.com

*Corresponding author

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Abstract. As a municipality and an important western strategic fulcrum of the "Belt and Road", Chongqing has a position that cannot be ignored. With the deepening of China's urbanization process and economic globalization, the state has established an international metropolis as the development planning goal of Chongqing. Therefore, it is necessary to accurately measure the urban competitiveness of Chongqing City in order to adapt to the new development requirements. Based on the analysis of the theoretical path of Chongqing's construction of an international metropolis, this paper draws on the reliable evaluation index system of urban competitiveness, using Tokyo, Hong Kong, Beijing, Shanghai, Xi'an and Chengdu as comparative samples, using principal component analysis. Chongqing's current development level has been measured, and based on this, the development situation of Chongqing City is judged and proposed to build an international metropolis.

1. Introduction

Chongqing, one of the four municipalities directly under the Central Government of China, is a national central city, an economic center and financial center in the upper reaches of the Yangtze River, and a center for shipping, politics, culture, education, science and technology [1]. It has unique resource endowments and development opportunities. In 2011, the State Council approved the "Chengdu Economic Zone Regional Plan" to clearly position Chongqing as an international metropolis [2]. To build Chongqing into an international metropolis is not only to develop Chongqing's own development prospects, but more importantly, it has important strategic significance for Chongqing to lead the upper reaches of the Yangtze River and enhance China's international influence.

The premise of studying the path of Chongqing's international metropolis construction is to grasp the development patterns and opportunities of Chongqing on the basis of grasping the law of the formation and development of international metropolises [3,4]. The measurement of the city's comprehensive competitiveness is an effective way to learn about the overall development status and advantages of the city and the shortcomings, so that the rational path for Chongqing to build an international metropolis can make sense [5]. Based on this, the research ideas of this paper can be determined: First, analyze and summarize the formation path of foreign internationalized metropolises and the experience of domestically building international metropolises; secondly, focus on the status quo and problems of Chongqing's industrial development; The formation path of the international metropolis is merged with the current situation in Chongqing, and a reasonable construction path for Chongqing to build an international metropolis is found.

The research methods in this paper include text analysis, data analysis, principal component analysis, and comparative analysis, etc. Specifically, it is to measure the development level of Chongqing and its gap with international metropolises by analyzing the data of Chongqing and several specific cities, in order to provide lessons for Chongqing to build an international metropolis. At the same time, we will identify the shortcomings, find out the shortcomings, and study the nature

of the problem through the phenomenon, and then explore the path suitable for Chongqing to build an international metropolis.

2. Literature Review

2.1 The concepts of an international metropolis

In terms of definition, international metropolises have been recognized as having to have strong international first-class comprehensive strength and reach the international level of urban service radiation range, but different scholars put attention on different priorities. Hall P. (1966) [6,7] embodied the connotation of an international metropolis as a major political power center. The International Trade Center National Financial Center Talent Center is a large gathering center for information gathering centers. The entertainment industry has become an important industrial sector. Cohen R. [8] (1981) believes that an international metropolis is the coordination and control center for a new international division of labor. Friedmann J. [9,10] (1986) pointed out that an international metropolis is an organizational node in the global economic system, a base for global capital organizations and coordinated production and markets, a major location for international capital pooling, and a destination for a large number of domestic and international immigrants. Sassen S. [11,12] (1991) defines an international metropolis as a developed financial and business service center. As a gathering place for corporate headquarters, international metropolises provide good infrastructure and services for the global economic operations and management of multinational corporations. From the perspective of information network, Castells M. [13] (1991) believed that the international metropolis is the main node of the global network, and it is expressed as a place that “connecting the production and consumption centers of high-level service industries in the global network with their supporting society."

From all above, today, resource exchange has the characteristics of diversified forms and being meticulously used. Internationalized metropolises are not only an important living circumstance that carries a large population, but also a key distribution node for human development resources. Diversified resource flows require cities to have comprehensive resource processing capabilities, and there must be no obvious shortcomings in finance, politics, transportation, information, and culture.

2.2 Evaluation criteria and hierarchy of international metropolises

Friedmann J (1986) [7] proposed seven indicators for measuring international metropolises, namely the location of multinational corporations, major financial centers, important manufacturing centers, important transportation hubs, concentration of international institutions, rapid growth of service sectors, and population. The scale has reached a certain standard. In 1995, on the basis of the original measurement indicators, Friedmann J. increased the amount of “population migration destination” and re-divided the international metropolis according to the size of the economic region connected by the city (Table. 1). Friedmann J., as a scholar who studied international metropolises earlier, is also recognized by the academic community.

Table 1 Friedmann J.'s international metropolitan hierarchy.

Level	Cities
First level	New York; London; Tokyo
Second level	Paris; Frankfurt; Miami; Los Angeles; Amsterdam; Singapore City; Madrid; Zurich; Mexico City; Sydney; São Paulo; Seoul
Third level	Houston; Chicago; Seattle; San Francisco; Ōsaka-Kobe; Boston; Vancouver; Toronto; Montreal; Barcelona; Hong Kong; Milan; Lyon; Rhine-Ruhr; Munich

Although scholars have different research perspectives, it can be basically considered that internationalized metropolises are under the background of globalization and networking. Cities continue to integrate global resources, actively adjust industrial structure and spatial layout, and gradually strengthen integration with the world economy. And thus formed and developed in the process of gradually moving to the top of the global urban system. At the same time, most scholars also agree on the cities at the top of the international metropolitan system. It is generally considered that New York, London, Paris, and Tokyo are heavyweights. International metropolis.

2.3 City competitiveness

In response to the measurement of urban competitiveness, Professor Peter of Bucknell University in the United States chose a set of variables to explain competition and proposed the following analytical framework [14]:

City Competitiveness (UC)=F (Economic factors; Strategy factors). (1)

Among them, economic factors = production factors + infrastructure + location + economic structure + urban environment; strategic factors = government efficiency + urban strategy + corporate sector cooperation + institutional flexibility. Peter emphasized that the choice of indicators is crucial when assessing urban competitiveness, and that distinguishing between urban competitiveness and national competitiveness is the key to evaluating urban competitiveness.

REjia-Linnamaa [15,16] treats the city as a whole and believes that it is necessary to consciously develop the city's core competitive advantage, rather than directly defining the policy objectives in both business and employment. He believes that the competitiveness of a city is mainly determined by six factors. They are members of the infrastructure, business, human resources, quality of life, institutional and policy networks, and networks (Fig. 1).

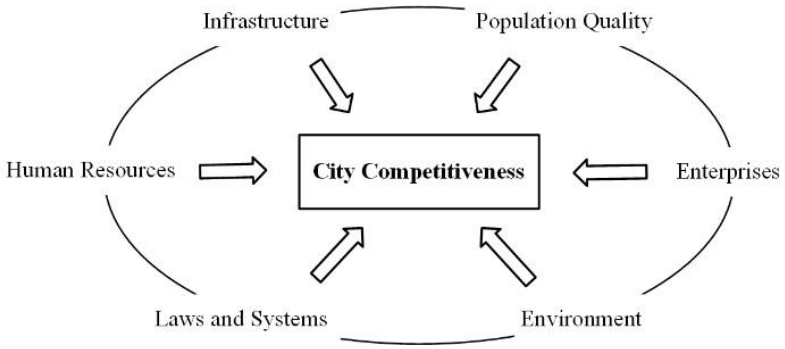

Fig.1 Model of urban competitiveness network.

Iain Begg [17] combines the concepts and evaluation methods of urban competitiveness, combining urban competitive capital and potential competitive outcomes to analyze urban competitiveness. In 1999, he presented a complex “maze” (Fig. 2) to illustrate the “input” of urban performance (top-down sectoral trends and macro-impacts, corporate traits, trading environment, innovation and learning capabilities) and “ The relationship between output (the employment rate

and the specific standard of living determined by production) combines the explicit and determined elements of urban competitiveness.

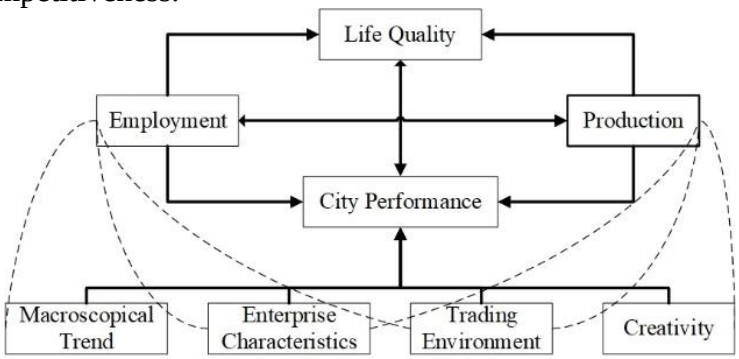

Fig.2 Model of urban competitiveness maze.

In China, *The Study and Empirical Analysis of China's Urban Competitiveness*, written by Dr. Yu Pengfei, is the first monograph on the systematic study of urban competitiveness in China, in which the author puts forward the basic theoretical framework of urban competitiveness: the bow-string model. The model compares the hard separation force to the bow, the soft separation force to the string, the city industry to the arrow, they interact together to form the city's competitiveness. The better the quality of the bow string, the more appropriate the match, the greater the force formed, the farther the industrial arrow shot, the greater the value of the benefits. Among them, the elements contained in the hard and soft forces are as follows:

Hard forces include human competitiveness, capital competitiveness, technology competitiveness, structural competitiveness, infrastructure competitiveness, location competitiveness, environmental competitiveness and aggregation.

Soft forces include order competitiveness, cultural competitiveness, system competitiveness, management competitiveness and open competitiveness.

Although academics are still inconsistent in some aspects of urban competitiveness research, and the theoretical framework of urban competitiveness is different, there are consensus in some major aspects: First, the competition between countries and cities is about Its wealth (or value) and its growing competition, but it also includes multiple sides. Second, to evaluate the index system of urban competitiveness, we must establish a convincing theoretical basis and theoretical framework, and we cannot arbitrarily extract indicators for combination. Third, many of the key indicators of urban competitiveness are soft indicators, i.e., questionnaire indicators. Fourth, to study urban competitiveness, it is necessary to study its performance and study the constituent elements.

3. Measurement of Chongqing’s Urban Competitiveness

3.1 Sample cities and indicator systems

3.1.1 Selection of sample cities

According to the existing research results of urban competitiveness at home and abroad, it can be seen that urban competitiveness is a comprehensive indicator of the multiple influences of various complex factors. It includes the interrelationship between various elements in the urban system and also reflects In competition with other cities in the outside world. Therefore, in the measurement of Chongqing's urban competitiveness, this paper refers to the existing theory and combined with the actual situation, from the three-level goal orientation for Chongqing to select a number of cities for comparative analysis (Table. 2).

Table.2 Sample city selection results.

Cities	Reason for selection
Tokyo; Hong Kong	They are recognized international metropolises that reflect the gap and provide an example for Chongqing to build an international metropolis.
Beijing; Shanghai	They represent the top level of urban development in China and can represent the staged goals and reliable references of Chongqing's development.
Chengdu; Xi'an	They are located in the west of China with Chongqing, with similar development environment and development level, and are closely related to Chongqing. They have great reference for the development of Chongqing.

3.1.2 Establishment of indicator systems

At present, there are a large number of researches on the evaluation index system of urban competitiveness. This paper extensively collects literature for text analysis. Based on the actual situation in Chongqing, it mainly draws on the urban competitiveness index system established by Wang Tingkui and others (Wang Tingkui, Wang Zhengyan, Zhou Wei, 2017). With the urban competitiveness network model of Linnamaa, combined with the actual situation, according to the principle of comparable, measurable and comprehensive, a comprehensive evaluation index system of urban competitiveness consisting of 7 first-level indicators and 26 second-level indicators is constructed (Table 3).

Table 3. Evaluation index system of urban competitiveness.

first-level indicators	second-level indicators
Comprehensive economic strength	GDP (A1) Per capita GDP (A2) Fixed asset investment in the whole society (A3) Second and third industries' Proportion of GDP (A4) Retail sales of social consumer goods (A5)
Enterprise competitiveness	Industrial output (A6) Industrial comprehensive economic benefit index (A7)
Science and technology	Education funds' proportion of fiscal expenditure (A8) Per capita education funding (A9) Number of college students per 10,000 people (A10)
Openness	Total import and export trade (A11) Number of visitors (A12) Financial institution deposit balance (A13) Passenger traffic (A14) Freight traffic(A15)
Infrastructure	Urban built-up area (A16) Highway mileage (A17) Total water supply (A18) Per capita park green area (A19) Post and telecommunications business (A20)
Government performance	Local budgetary balance (A21) Employed persons' proportion of the total resident population at the end of the year (A22)
Residents' quality of life	Per capita disposable income of urban residents (A23) Engel coefficient of all residents (A24) Per capita housing area of urban residents (A25) Number of doctors per 1,000 people (A26)

For some indicators, the most recent 2017 and 2018 data are not available, so the data time scale is determined in 2016. The data of each city are from the 2016 Urban Statistical Bulletin, the China Urban Statistical Yearbook and the official website of the statistical department.

3.2 Principal component analysis

3.2.1 Determination of the principal component

After running SPSS 25.0 to normalize the original data, factor analysis is performed. According to the principle that the feature root is greater than 1 and the cumulative contribution rate is greater than 85%, five principal components are selected, and the cumulative variance contribution rate reaches 98.468%, which indicates that the five principal components can explain 98.468% of the original 26 indicator variables. After mathematical verification, the accuracy of data collection is high, which reflects the level of urban competitiveness. The characteristic root and contribution rate of each principal component are shown in Table. 4.

Table 4. Table of principal element.

Component	Total	Variance contribution rate /%	Cumulative percentage /%
1	14.202	54.624	54.624
2	4.748	18.260	72.884
3	3.030	11.655	84.539
4	2.419	9.304	93.843
5	1.202	4.624	98.468

3.2.2 Urban competitiveness score and evaluation

The principal component is calculated by using the ratio of the sum of the principal component corresponding feature values and the sum of the total feature values of the extracted principal components as weights. The 2016 first-tier cities' competitiveness scores are obtained and the scores are ranked (Table 5). In the same way, the same method is used to rank competitiveness from the seven aspects shown in the first-level indicators (Table 6).

Table 5 Comprehensive scores and rankings of principal components in each city.

City	F1	F2	F3	F4	F5	Total	Rank
Tokyo	2.620	0.740	0.837	0.934	0.339	5.470	1
Hong Kong	0.691	1.760	-0.332	0.469	0.532	3.120	3
Beijing	0.306	0.403	0.928	0.660	0.068	2.363	4
Shanghai	0.533	1.436	0.590	0.568	0.304	3.431	2
Chengdu	-0.386	0.505	-0.012	-6.519	0.032	-6.379	5
Xi’an	-3.756	0.717	-10.497	0.537	0.356	-12.643	7
Chongqing	0.559	-1.761	0.014	0.310	0.707	-0.171	6

Table 6 City competitiveness and ranking of sample cities.

City	Comprehensive economic strength	Enterprise competitiveness	Science and technology	Openness	Infrastructure	Government performance	Residents' quality of life
Tokyo	3.144(1)	0.850(2)	2.115(1)	5.219(1)	0.961(1)	-0.758(7)	0.792(1)
Hong Kong	1.896(2)	1.110(1)	0.768(2)	0.655(2)	0.568(2)	0.869(1)	0.670(2)
Beijing	0.812(4)	0.655(3)	-0.277(7)	0.039(3)	-0.277(6)	-0.428(5)	-0.069(5)
Shanghai	0.973(3)	-0.813(7)	0.585(3)	-0.077(4)	0.542(3)	-0.083(3)	-0.012(4)
Chengdu	-0.952(6)	-0.692(6)	-0.276(6)	-0.418(6)	-0.247(5)	-0.604(6)	-0.185(6)
Xi’an	-2.68(7)	-0.140(5)	0.423(4)	-0.135(5)	-0.963(7)	-0.308(4)	0.021(3)
Chongqing	0.789(5)	0.206(4)	0.125(5)	-0.682(7)	-0.082(4)	0.283(2)	-0.306(7)

4. Discussion

Among the sample cities, the status of Hong Kong and Tokyo's cosmopolitan cities has been verified, especially in Tokyo, which ranks among the top ones in terms of evaluation results. Beijing and Shanghai are typical representatives of China's developed first-tier cities. They are also China's economic, financial, and trade centers. Their economic strength is second to none in China. Chengdu and Xi'an, which are similar to Chongqing's development environment, are at the same level as Chongqing. There is still a certain gap between the international and domestic urban development top level.

In the analysis results, the shortcomings and advantages of urban development in Chongqing are more obvious. Observing the rankings of the principal component assessments in Chongqing, we can see that Chongqing's most significant advantage is reflected in government performance, ranking second in the rankings. This score is reflected in the government's fiscal revenue and expenditure and employment. During the study period, the Chongqing Municipal Government made a long-term plan for the construction of land in the main urban area, and reserved enough land for real estate development [18,19]. With municipal construction. This brought the land sales revenue to the government and eased the financial situation. At the same time, it also kept the price of Chongqing commercial housing at a relatively stable trend. Chongqing's excellent government performance is closely related to this. It can be seen that in today's Chinese cities, land and real estate still largely hamper the development of urban industries and the living standards of citizens. Employment and housing are not only the people's livelihood, but also reflect the management level of the government and determine the cornerstone of a city's competitiveness.

However, several other indicators in Chongqing often show a backward trend in comparison with developed cities, especially in terms of openness, quality of life and comprehensive economic strength [20]. After the outbreak of the international financial crisis in 2008, the prices of raw materials and resource products in Chongqing declined rapidly, and the investment in fixed assets increased sharply. This brought development opportunities to the traditional factor-driven industries in which Chongqing was originally important. Nevertheless, after entering The New Normal in 2014, the trend of Chongqing entering the post-industrial era is becoming more and more obvious. The capital, labor and other factors have shifted from non-service industries such as construction to service industries, and many traditions such as construction and machinery manufacturing. The key factor-driven growth model of the pillar industry is unsustainable, and the emerging factors such as innovation and technological progress are not yet mature, which has become the bottleneck for Chongqing's current development to an international metropolis [21]. Accelerating industrial upgrading and upgrading, implementing innovation-driven development, cultivating innovation and driving new development momentum is an urgent task facing the industry in Chongqing. The short board currently presented in Chongqing is more closely related to the soft power in the “bow string model”. Chongqing is still far from the international metropolis in terms of the linkage construction with the surrounding major cities and improving the quality of life of citizens. And these also have a close and complex relationship with the various socio-economic elements of the city.

5. Conclusion

Through the analysis and comparison of Chongqing's urban competitiveness, it can be found that despite the large gap with developed cities, Chongqing has a good foundation for urban development and is a new first-tier city in China with optimistic prospects. Undoubtedly, an international metropolis must have strong service capabilities in all aspects. The problem facing Chongqing is how to make up for its current weaknesses.

Going with a high-quality and reasonable industrial structure is a prerequisite for improving the development mode and a prerequisite for an international metropolis. Chongqing still needs to optimize its industrial structure and cultivate its industry. With the deepening of economic

globalization, finance has increasingly become the lifeblood of the development of an international metropolis [22]. On the basis of the existing industry, the status of higher-level financial centers in Chongqing can be built by cultivating local representative financial institutions. At the same time, Chongqing should continue to support the inherent strengths of the manufacturing industry, vigorously develop information technology services for the manufacturing industry, and improve the program design, development, and integrated integration capabilities of key industry information application systems. In addition, in the aspect of urban environmental construction, optimize the spatial layout of the urban business circle, improve the core business district level of the municipal core business district, district and county (autonomous county), and activate the benign linkage of various elements in the urban system. In a rapidly changing environment, cooperation with cities with similar development levels and similar geography will take the first-tier cities in China as a phased goal, and the international metropolis as a reference and long-term blueprint will improve the living experience and life of urban residents. As the ultimate goal of urban development, quality is the only way to fill the shortcomings and move closer to an international metropolis.

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