

# Study on the Assessment of Urban Public Security Capacity of Yangtze River Economic Belt

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**Keywords:** Ability assessment, Entropy value method, Indicator system, Urban public security, Yangtze river economic belt.

**Abstract.** In the context of the national push for the development of the Yangtze river economic belt, this paper elaborates the capability indicators in the "vulnerability and capacity indicators", and builds an evaluation index system by combining the principles of index construction and the current situation of urban public security in China. Combined with the analysis results and the obtained literature, it is found that the Yangtze River city belt urban public security in the operation of the important factors and the existing shortcomings.

## Introduction

In September 2016, the outline of the development plan of the Yangtze river economic belt was officially released, establishing a new development pattern of the Yangtze river economic belt featuring "one axis, two wings, three poles and multiple points". In recent years, the development of the Yangtze river economic belt gradually rose to a new round of national strategy, therefore this article selects the capital city of nine provinces of the Yangtze river economic belt, and two municipalities directly under the central government as the typical research object, to evaluate its representative cities in urban public safety related investment and performance ability, in the context of countries to promote the development of the Yangtze river economic belt has important research significance.

The innovation of this paper lies in the construction of urban public safety index system based on the characteristics of urban development in the Yangtze river economic belt, and the evaluation and analysis of its various capabilities with multiple indicators. This paper aims to strengthen the research on urban public safety and establish the evaluation index system of urban public safety in China. Secondly, this paper studies urban public security from a regional perspective by taking the Yangtze River economic belt as the evaluation object in combination with the national background of promoting the development of the Yangtze River economic belt.

## Literature Review

The initial research focus of urban public safety management is on the prevention and control of natural disasters. With the continuous expansion of the content of urban public security governance, the research on urban public security management is also developing. In the report of the 19th national congress of the communist party of China; it is pointed out that a more effective regional coordinated development mechanism should be established. The practice of regional coordinated development has proved that the effective construction of regional economies is inseparable from a good urban public security environment, especially in the critical period of building a moderately prosperous society in an all-round way and accelerating social transformation. In the process of social development, China is faced with many contradictions and problems to be solved, such as various conflicts of interest between different interest groups; Group events caused by social injustice; The credibility and ruling ability of the government are challenged; The synergy between the management system and social development needs lags behind. How to effectively prevent various public security risks while developing steadily in regional economy and transform the

"passive response" regional public security management mechanism into "active governance" is an important action to improve and optimize the governance capacity and system in the field of regional urban public security. At present, most of the research is still in the stage of a broad overview of the theory of urban public safety, and there is a lack of quantitative research on the evaluation index and system of a specific region.

## Study Area and Research Methodology

### Study Area

The Yangtze river economic belt is the most important east-west axis in China's territorial space development, covering 11 provinces and cities, including Shanghai, Jiangsu, Zhejiang, Anhui, Jiangxi, Hubei, Hunan, Chongqing, Sichuan, Yunnan and Guizhou. It covers an area of about 2.05 million square kilometers, and its population and GDP both exceed 40% of the country's total. The Yangtze river delta, the middle reaches of the Yangtze river and the Chengdu-Chongqing urban agglomeration are important parts of the Yangtze river economic belt, as well as key areas for comprehensively deepening reform and opening up and promoting new urbanization. They play an important role in China's regional development pattern.

### Research Methodology

#### *Entropy Method.*

In this paper, the entropy method commonly used in comprehensive evaluation is used to determine the weight of the index system. The weight of the index system determined by the entropy method can fully reflect the difference of each index among cities, and the weight value calculated by it has higher credibility and accuracy than the subjective weighting method. This paper will be the ability of urban public safety assessment index is decomposed into target layer and base layer, criterion layer and index layer, to the major cities in the Yangtze river economic belt public safety ability for quantitative and qualitative analysis.

#### *Calculation Steps of Entropy Method.*

A) Raw data collection and collation.

It is assumed that the research area is composed of  $m$  cities, and there are  $n$  evaluation indexes reflecting the urban public security capability, and the original data are collected. Let the matrix of the original data be:

$$X_1 = (x_{ij})_{m \times n} \quad (i = 1, 2, \dots, m, j = 1, 2, \dots, n) \quad (1)$$

B) Data processing -- standardized processing

Since the dimensions and orders of magnitude of each index are different, it is necessary to standardize each index in order to eliminate the impact of different dimensions on the evaluation results.

C) Calculate index entropy  $e$  and utility value  $g$

$$e_j = -\left(\frac{1}{\ln m}\right) \sum_{i=1}^m R_{ij} \ln R_{ij} \quad (i = 1, 2, \dots, m; j = 1, 2, \dots, n) \quad (2)$$

### Establishment of Index System

Through summarizing the domestic and foreign related research about urban public safety

capability assessment, together with the present situation of the urban public safety and policy data, etc, for reference to annals and statistical data analysis, the ability for the Yangtze river economic belt city public security from the economic development, people's livelihood security, emergency reserve capacity, environmental governance capacity four dimensions analysis, finally constructs the evaluation index system of urban public security capabilities in the Yangtze river economic belt overall framework, such as table 1:

Table 1. Evaluation index system of public security capability in Yangtze river economic belt

Goal layer	Base layer	Criterion layer	Index layer
Urban public safety capability assessment system	Economic development capacity	Economic security	Per capita gdp
			Per unit gdp energy consumption
	People's livelihood capability	Social security	Social insurance coverage
			Public health
		Number of beds in health care institutions	
		Number of health manpower	
		Public transport safety	Length of public transport lines
			Passengers transported by public traffic vehicles
	Emergency reserve capacity	Daily construction work	The proportion of public security input in fiscal expenditure
			Safety mechanism allocation rate
	Environmental governance capability	Environmental safety	The proportion of government expenditure on energy conservation and environmental protection
			The daily wastewater treatment capacity
			The percentage of industrial solid wastes that are comprehensively utilized

In this paper, there are 13 evaluation indexes in the evaluation of urban public security capacity. There are two ways to obtain the indexes. The second method is obtained by quadratic calculation of multiple indexes. In the following part, indexes of basic layer are represented by Y, indexes of criterion layer are represented by Z, and indexes of index layer are represented by  $\chi$ .

### Data Sources and Collection

In this paper, the Yangtze river economic belt city public security capability assessment measure data mainly comes from: "Chinese city statistics yearbook 2018," China's regional economic statistics yearbook 2018, each city statistical yearbook 2018, "the urban national economic and social development statistical bulletin 2017, from city to city environment bulletin, 2017, the province bureau of statistics data, and the provinces with individual places the government work report. Some of the data were obtained from the bulletin of solid waste prevention and control and the bulletin of water resources situation in relevant cities.

## Results and Discussion

### Given the Weight

This paper USES Matlab software to calculate the weight of entropy value method, and realizes the weighting of 13 index layers of the urban public security capacity assessment system, and presents the weights in the form of weight table.

Table 2. Index weight of urban public security capacity assessment system in Yangtze river economic belt

Goal layer	Base layer	Criterion layer	Index layer	
Urban public safety capability assessment system(1)	Y <sub>1</sub> (0.1211)	Z <sub>1</sub> (0.1211)	χ <sub>1</sub> (0.071)	
			χ <sub>2</sub> (0.0501)	
	Y <sub>2</sub> (0.4652)	Z <sub>3</sub> (0.2646)	Z <sub>2</sub> (0.0692)	X <sub>3</sub> (0.0692)
			X <sub>4</sub> (0.0667)	
			X <sub>5</sub> (0.1051)	
			X <sub>6</sub> (0.0928)	
			X <sub>7</sub> (0.076)	
			X <sub>8</sub> (0.0554)	
	Y <sub>3</sub> (0.1617)	Z <sub>5</sub> (0.1617)	X <sub>9</sub> (0.0788)	
	Y <sub>4</sub> (0.2521)	Z <sub>6</sub> (0.2521)	χ <sub>10</sub> (0.0829)	
			χ <sub>12</sub> (0.116)	
			χ <sub>13</sub> (0.1107)	
			χ <sub>14</sub> (0.0254)	

**Determinants**

Combined with the above weight and the calculation results of the comprehensive evaluation, the comprehensive analysis of the original data and the calculation results shows that the following factors have a significant impact on the ability evaluation.

***Social Insurance Coverage Rate, Medical Facilities Allocation Rate.***

By analyzing the weight of each index, health agencies can be found the health institutions beds in all indicators ranked second, explain from city to city in medical facilities in terms of investment and attaches great importance to the strength gap is bigger, this part mainly belongs to the people's livelihood support capability the base layer. In the calculation results of the comprehensive evaluation of indicators at all levels, the comprehensive evaluation value of the number of health technicians is the largest, and the comprehensive evaluation value of people's livelihood security ability is also ranked high, which also shows that people's livelihood security ability is the most important factor affecting the public security ability of 11 cities in the Yangtze river economic belt.

***Financial Investment.***

According to the weight calculation of each index in the evaluation system, the weight of three fiscal inputs (medical and health care, public safety, energy conservation and environmental protection input proportion in fiscal expenditure) is relatively large in each index, indicating that there is a big gap in the relevant input of city governments. However, the weight of economic development capacity is the smallest among the four basic level indicators, because each city is highly developed as a provincial capital, so the difference in economic capacity is relatively small, but there is a big gap in its investment in public security. Economic development capability is the basic element of urban public security development capability index. The continuous growth of a city's economic capability also means that the government can invest more capital, technology, manpower and material resources to support public security, medical and health care, energy conservation and environmental protection and other public undertakings.

***Environmental Governance Capability.***

The weighted value of environmental safety ranks the second among all criteria, indicating that there is a big gap between the investment and performance of cities in environmental safety. The weighted value of daily sewage treatment capacity ranks the first in the index layer, indicating that there is a big gap between cities in sewage treatment capacity. On the one hand, it reflects that different cities pay different attention to and invest in environmental quality management; on the

other hand, it reflects the gap between cities in relevant energy-saving and environmental protection science and technology. While promoting the development of urban public safety, attention should be paid to improving the urban environment, strengthening the construction and supervision of urban air quality, greening, sewage and solid waste treatment, etc., so as to lay a solid ecological and environmental foundation for the stable development and safe operation of the city.

### Discussion

By using the weight calculated above, the comprehensive evaluation value of urban public security capacity assessment of each city is calculated, and the value and ranking of the comprehensive evaluation index of each index layer are listed correspondingly, as shown in table III. Among them, the greater the comprehensive evaluation value is, the better the sample effect is. The samples in this paper are the provincial capital cities of nine provinces in the Yangtze river economic belt, as well as Shanghai and chongqing. Therefore, the value of the comprehensive evaluation can directly reflect the importance, investment level and development ability of the 11 cities in public security in 2017, so as to evaluate the strength of the public security ability of the cities in the Yangtze river economic belt.

Table 3  
Summary table of the comprehensive evaluation value

City	Base layer				Comprehensive evaluation results	Ranking
	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>	Y <sub>4</sub>		
Shanghai	0.0732	0.3376	0.0192	0.2305	0.6605	1
Nanjing	0.0973	0.1828	0.0613	0.2465	0.5879	2
Hangzhou	0.1083	0.2155	0.0228	0.0602	0.4068	4
Hefei	0.0606	0.0716	0.0184	0.052	0.2026	11
Nanchang	0.0558	0.0703	0.0483	0.1344	0.3088	8
Wuhan	0.0427	0.227	0.0839	0.05	0.4036	5
Changsha	0.067	0.141	0.0948	0.0597	0.3625	6
Chongqing	0.0501	0.3701	0.0365	0.0884	0.5451	3
Chengdu	0.0691	0.1367	0.068	0.0855	0.3593	7
Kunming	0.0221	0.1346	0.0233	0.1132	0.2932	9
Guiyang	0.0072	0.0909	0.1018	0.0308	0.2307	10

### Conclusion

This paper mainly studies the public safety capacity of 11 cities in the Yangtze River economic belt, and combines the index system with the input and performance of each index in 2017. Entropy value method is used for quantitative analysis and evaluation. The main research results are as follows:

#### **Establish the Evaluation Index System of Public Safety in the Yangtze River Economic Belt**

This paper summarizes the research status of urban public security, elaborates the scope of the capability index in the index of "vulnerability and capacity", and analyzes and studies the urban public security capacity of the Yangtze river economic belt from four dimensions by combining the mature studies of predecessors and the current situation and policy data of urban public security in China. The four dimensions were further refined into a criterion layer, and finally an evaluation index system of 13 indicators was established.

#### **Entropy Value Method Was Used To Conduct an In-Depth Quantitative Analysis of the Evaluation Index System of Public Security Capacity of 11 Cities in the Yangtze River Economic Belt**

Firstly, all indexes in the evaluation index system are weighted. Through the comparison of relevant indicators in each province in 2017, the data of people's livelihood security ability are quite different. Among the three criteria levels below, public health accounts for the largest proportion, public transportation safety takes the second place, and social security accounts for only about 7%.

Entropy value method was used to calculate the comprehensive evaluation value of each index in 11 cities, so as to conduct the comprehensive evaluation of public security capacity of cities in the Yangtze river economic belt. For example, in terms of economic development capability, the top three cities with the highest evaluation index are Hangzhou, Nanjing and Shanghai, and the bottom three cities are Wuhan, Kunming and Guiyang.

In order to observe the differences of the comprehensive evaluation index among the 11 cities, this paper divided the public safety ability regions of the 11 cities based on the comprehensive evaluation index.  $Z \geq 0.5$  is the area with a high level of urban public safety capacity, including Shanghai, Nanjing and Chongqing;  $0.3 < Z < 0.5$  refers to areas with moderate urban public safety capacity, including Hangzhou, Wuhan, Changsha, Chengdu and Nanchang;  $Z < 0.3$  is the area with poor public safety ability level, namely Kunming, Guiyang and Hefei.

### **Combined with Previous Research Results and Empirical Analysis Results**

It can be concluded that the important influencing factors of public safety capacity in 11 cities of the Yangtze river economic belt are fiscal input, social insurance coverage rate and medical facilities, government security agency allocation rate and environmental governance capacity.

As the final comprehensive evaluation value calculated by the entropy method is greater, the sample effect is better. Therefore, the urban public security capacity of 11 cities as samples in this paper can be seen intuitively from the comprehensive evaluation value. Based on the comprehensive analysis of the above calculation results, it can be seen that each city should take the area with high urban public safety ability as the standard and target, combine with its own performance in various basic level indicators, find the deficiencies, and improve the level of relevant public safety ability by improving the corresponding degree of attention, investment level and policy support.

### **Policy Implications**

Combined with the comprehensive evaluation system and evaluation results, combined with the current research status, the following countermeasures and Suggestions for the safe operation of the city are proposed.

#### **Accelerate the Transformation of the Mode of Economic Development, Vigorously Develop the Economy and Provide More Comprehensive Financial Support**

Cities should take economic development as the most important goal, accelerate the adjustment of industrial structure, change the mode of economic growth and increase support for the tertiary industry. We will increase investment in scientific and technological research and innovation, give full play to the role of science and technology in economic and social development, and raise the efficiency of energy use and the utilization of new energy sources, so as to ensure the healthy, coordinated and sustainable development of the economy and society of cities.

#### **Strengthen People's Livelihood Guarantee Ability and Provide a Healthy and Stable Living Environment for Residents**

The improvement of people's livelihood security capability is an inevitable requirement in the process of urban development, and also an important guarantee factor to improve the level of public security in a city.

#### ***Strengthen the Construction of Supporting Facilities Such As Education and Medical Treatment.***

The existing resources should be utilized to integrate public supporting facilities such as education and medical treatment, so as to solve the situation of backward infrastructure and poor hardware conditions. In terms of medical treatment, the quality of medical staff should be improved to improve the service rate of medical supporting facilities, so as to reduce the pressure of medical



facilities. In terms of medical facilities, government financial support should be increased to supplement resources and facilities for the existing problems and urgent situation of the city. In terms of health technical personnel, policies should support the entry of highly educated personnel, improve the quality of medical personnel, and fundamentally improve the level of public health undertakings.

***Expand the Coverage of Social Insurance.***

We will narrow the gap between the rich and the poor among urban residents, improve their living standards, expand the coverage of social insurance, and strive for full coverage of basic social insurance. This will help urban residents and social vulnerable groups to enhance the ability to resist various urban public security incidents, but also for the government to share the administrative pressure.

**Attach Importance to Ecological Environment Construction and Improve Energy Conservation and Environmental Protection Capacity through Technological Innovation**

We can rely on universities and scientific research institutes to establish scientific research bases for public safety management, increase financial support for scientific research on public safety, and support researchers and public safety management workers to conduct in-depth and thorough research on major public safety issues in practice. We will vigorously support the development of the public safety industry, promote the transformation of scientific and technological achievements in public safety management, and stimulate social innovation to the greatest extent. Improving the ability of scientific and technological innovation plays a decisive role in environmental safety.

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