



CONSTRUCTION AND EMPIRICAL STUDY OF QUALITY INDEX SYSTEM OF MULTI-  
CHANNEL URBANIZATION

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*Abstract*

*Throughout the development process of urbanization in the world, urbanization has shifted from industrial urbanization to multi-channel urbanization. On the basis of sorting out the connotation and development process of the multi-channel urbanization indicator system, this paper puts forward and constructs the multi-channel urbanization evaluation indicator system pertinently, and finds the deficiencies in its development process. On this basis, the index system was applied to 13 cities and towns in zhuzhou, chengdu and Beijing for comprehensive measurement, and the quality of multi-way urbanization of cities and towns was studied. The overall results show that the quality of urbanization development in the eastern region is better than that in the central and western regions, and the level of urbanization development in the higher administrative level is higher than that in the lower administrative level. The quality differences of urbanization development between regions are mainly reflected in the following five aspects: ecological environment quality, urban-rural overall planning quality and basic public service quality.*

*Keywords: Multi-Path Urbanization; Quality; Entropy Value Method; The Indicator System*

**I. INTRODUCTION**

Urbanization is a process that China is going through and will continue to go through for a long time. It has promoted the development of China's economy and at the same time raised people's



living standards. With the change of China's national conditions and social policies, the urbanization mode supported only by industrialization has caused a series of problems such as backward supporting facilities in cities and towns, air pollution and quality of agricultural products. Therefore, China's urbanization has entered a quality-oriented transformation period, and the exploration of multiple approaches to urbanization other than industrialization has attracted more and more attention.

At present, Chinese scholars have carried out intense discussions on urbanization. There are many researches on urbanization quality from the perspectives of urbanization concept connotation, urbanization mode, dynamic mechanism and quality measurement. Multi-channel urbanization means that in the process of urbanization, different towns promote the development of urbanization with different approaches and factors according to their own economic foundation, location factors, characteristic resources, etc., combined with their own positioning and development goals. Multi-channel is the main driving force to promote urban development, mainly including industry, agriculture, tourism, real estate, commerce and trade, science and education industry, transportation hub and other industries. Compared with traditional urbanization, multi-channel urbanization is coordinated with China's socio-economic development path, and integrated with the development concepts of a beautiful China, ecological civilization, quality and fairness. It is in line with the demand of putting equal emphasis on both production and life in urban areas and diversified development at the present stage, so as to realize the ultimate goal of urbanization -- all-round development of people.

## **II. RESEARCH QUESTION**

Multi-channel urbanization is the innovation of ideas and models in the process of urban development. It is the comprehensive embodiment of the multi-field of culture and multi-mode of production in the development of regional urbanization. It is the effective integration of resource subdivision based on the town, and the efficient development of the city. On the whole, it can better promote the diversification of cities and the overall development of urban and rural areas. In the process of development, it pays attention to the dynamic development process instead of pursuing static digital results. Therefore, how to establish and apply a multi-channel urbanization quality indicator system at this critical moment, supervise and evaluate the quality of its urbanization development, and find the deficiencies and improve them is an important research problem of this paper.

### **2.1 RESEARCH PURPOSE AND SIGNIFICANCE**

By sorting out the development process of multi-channel urbanization quality evaluation index system, this paper puts forward and makes use of multi-channel urbanization evaluation index system in a targeted way, so as to provide practical basis and theoretical reference for the construction of urbanization quality evaluation index system of 13 cities and towns in Beijing, zhuzhou and chengdu. Explore the deficiencies in its development process, put forward opinions and Suggestions, and improve the quality evaluation index system of urbanization.



In addition, urbanization has shifted from industrial urbanization to multi-channel urbanization. This article in constructing multi-channel quality index system of urbanization, on the basis of using the entropy value method to Beijing, zhuzhou, chengdu and other 13 cities and towns urbanization quality evaluation, the evaluation results are classified and analyzed, and sums up the urban development way and its shortage, based on the calculated result is put forward to improve and perfect the development path of the town. While improving the quality evaluation system, theory and practice should be combined to comprehensively promote the urbanization development process and quality of each case town.

## 2.2 RESEARCH ON URBANIZATION INDICATOR SYSTEM AT HOME AND ABROAD

### Study on foreign urbanization index system

After zelda put forward the concept of urbanization, foreign scholars conducted a lot of studies on it, mainly qualitative and quantitative. It mainly involves related literature research on sustainable development, eco-city and residents' quality of life[1-5]. After world war ii, with the acceleration of global urbanization, foreign academic circles conducted comprehensive and in-depth studies on issues such as urban suburbanization, reverse urbanization, urbanization stage division and urbanization model of developing countries[6-10]. So far, there are few studies on the evaluation index system of urbanization quality.

Foreign quantitative research methods on urbanization level mainly include single index method and compound index method. Among them, the most representative single index method is the "S" stage theory proposed by the American geographer northam in urban geography [11]. In foreign countries, there are few systematic studies on the composite index method to measure the level of urbanization. Most of them are used in various theories of economic and social development as an improvement of the method to measure the level of urbanization. According to the research of foreign scholars on the composite index method, the method is basically the same. In order to measure the urbanization quality level of a country or region, a set of indicators that can reflect the characteristics of urbanization in various aspects are determined first, and then a comprehensive value is calculated according to the indicators. Toyo keizai shimbun, Japan, proposed a measure to measure the "urban growth factor" : total regional population, total local fiscal year expenditure, number of manufacturing employees, number of business employees, total industrial production, total wholesale business, total retail sales, total residential floor space, savings, telephone penetration. Japanese urban geographer naginao inaga et al proposed a concept of "city degree" to study the promotion of urbanization in the suburbs of Tokyo. As a composite index, city degree is mainly composed of five sub-indexes, including regional scale index, location index, economic activity index, static population structure index and dynamic population structure index. It is calculated by factor analysis method in mathematical statistics. British geographer kroc made a comprehensive analysis of population, occupation, residence and distance from the city center, and established a composite index system of urbanization level.



### Research on domestic urbanization index system

Compared with foreign countries, domestic academic researches on urbanization mainly focus on the connotation of urbanization, evaluation index of new urbanization quality and methods of measuring urbanization level. In the early stage, it mainly focused on the analysis of the development speed and level, that is, the quality of urbanization. Many scholars explored and evaluated the measurement method of urbanization level and regional urbanization level of different scales.

Literature research on evaluation methods of urbanization quality indicators in China shows that there are diverse evaluation indicators and methods for urbanization quality in China. Qualitative research mainly analyzes the problems existing in the development of urbanization from the macro or micro level. From the perspective of sustainable development, wan xiaoqiong elaborated the problems existing in China's new urbanization, such as land resource waste, migrant workers, urban-rural dual contradiction and resource and environment problems[12]. Li nan et al. summarized the low quality of urbanization into four aspects: urbanization lags behind the level of industrial development, land urbanization is faster than population urbanization, "semi-urbanization" phenomenon and urban diseases[13]. Hao huayong understood the restricting factors of urbanization quality from five aspects: industrial support, spatial form, urban-rural relations, public services and ecological environment[14].

Most of the quantitative research methods are entropy value method, comprehensive index evaluation method, analytic hierarchy process, principal component analysis, cluster analysis and natural fracture point method. From the perspective of research objects, most studies take cities, counties and provinces above the prefectural level as the objects of urbanization quality evaluation. Ye yumin (2001) put forward four categories of 13 indicators to measure the quality of regional urbanization in 9 mega-cities with urban population over 3 million in 1998[15]. Since then, especially since 2005, the literature on urbanization quality evaluation has increased significantly. hang apin (2005) set up 10 indicators and compared the urbanization quality evaluation system of 30 provincial capitals (excluding Lhasa) in 2002 with factor analysis method[16]. Zhu hongxiang (2007) used cluster analysis method and analytic hierarchy process to set 32 indicators in 17 cities of shandong province for calculation[17]. Yuan xiaoling et al. (2008) simplified the indicators, adopted 9 indicators, and used r-type clustering analysis method and factor analysis method to study the urbanization quality level of 10 prefecture-level cities in shaanxi province in 2005[18]. However, han zenglin et al. (2009) made a breakthrough in both methods and the number of objects, and adopted the entropy method to study the urbanization quality evaluation system of 288 cities at or above the prefectural level in 2007[19]. Zheng zizhen (2003) studied guangdong province from 2000 to 2002 for the first time by taking province as the research object and adopting single index method[20]. The National City Tuning Team of the Fujian Provincial City Team (2005) made progress in the comprehensiveness of the evaluation indicators. For the six provinces in East China in 2003, 31 indicators were set up, and the analytic hierarchy process was used for the measurement study[21]; Li Lin (2017), Sun Jing et al (2008), Li Shuang et al (2009), Wang Deli et al (2010), etc. all take the provincial domain as the research object, adopting the entropy method, the



multiplication model, etc. Research [22-26]. In comparison, county cities have less research on their sources due to fewer data sources, but there are still scholars to explore. For example: Bai Xianchun et al. (2005), for the 27 county-level cities in Jiangsu Province from 2000 to 2002, based on the LOWA operator construction index system, 25 indicators were established for research<sup>[27]</sup>; Xu Su et al (2011) Using the Delphi method and the analytic hierarchy process method, 27 indicators were established to evaluate the quality of urbanization in 37 county-level cities in the 2007 Yangtze River Delta<sup>[28]</sup>.

In summary, with the continuous advancement of urbanization and the acceleration of urban development, the measurement of urbanization level should also be measured from the original single indicator to the comprehensive indicator. The comprehensive indicators should cover all aspects of social and economic development. For example, Fang Chuanglin (2011) believes that urbanization quality is the organic unity of urbanization quality in economic, social and spatial aspects, and constructs a sub-factor measurement model from these three perspectives<sup>[29]</sup>. For the selection of research objects for urbanization quality evaluation, Chen Ming (2012) and other scholars believe that the national scale or county, township and other small scales should not be used as the evaluation object of urbanization quality, which seems to be somewhat sloppy<sup>[30]</sup>. In theory, as long as there is urbanization, we must pay attention to the quality of urbanization. At present, China has entered the stage of a primary urban society as a whole. It is undoubtedly necessary to strengthen the evaluation of urbanization quality at the national scale and to clarify the gaps at the macro level and the general direction for further improvement. The county towns and small towns are also an important part of the urban system. By continuously improving the quality of small-scale urbanization such as counties and townships, the micro-foundation of the quality of urbanization in the country can be built <sup>[31]</sup>.

Therefore, there are certain defects in the construction of urbanization quality evaluation index system at home and abroad. No matter from the selection of indicators and data sources, there is certain one-sidedness and accuracy. Moreover, urbanization is a dynamic process. The indicator system has not fully reflected its development process and its laws. Therefore, after combing the research results at home and abroad, this paper refers to the existing literature, based on the original indicator system, the improvement and application of the indicators, and puts forward relevant opinions and suggestions.

### III. CONSTRUCTION OF EVALUATION SYSTEM

The establishment of the indicator system is the premise for evaluating the quality level of urbanization. It is required that the selected indicators must reflect the characteristics of the urbanization quality of the city and its development and change laws. At present, China does not have a unified multi-channel urbanization evaluation index system. Based on a comprehensive analysis of existing research results, it mainly refers to authoritative research results at home and abroad, including "Summary and Reconstruction of New Urbanization Quality Evaluation Index System" and "China". According to the scientific, systematic,



operability, hierarchy, and comparability principles, the Urban Yearbook and the National New Urbanization Index System and Several Issues are used to construct multi-channel urbanization quality assessment indicators in rural areas. System(Table 1).

Table 1: Index system for urbanization quality assessment of multi-channel urbanization

Comprehensive evaluation layer B(Weights)	Factor evaluation layer C (weight)	Indicator evaluation layer D	Indicator attribute	Index weight
Population urbanization (0.015171)	Social structure (0.015171)	Non-agricultural population(%)	Positive indicator	0.010463
		The proportion of the number of employees in the second and third industries(%)	Positive indicator	0.004708
Economic development quality (0.142581)	Economic development (0.142581)	Per capita GDP (yuan)	Positive indicator	0.034715
		Per capita local fiscal revenue (yuan)	Positive indicator	0.024084
		The proportion of tertiary industry output value (%)	Positive indicator	0.002642
		Proportion of output value of high-tech products (%)	Positive indicator	0.009466
		Patent authorization amount (piece)	Positive indicator	0.058944
		Per capita disposable income of urban residents (yuan)	Positive indicator	0.003347
		Energy consumption per unit of GDP (tons of standard coal / 10,000 yuan)	Negative indicator	0.009382
Ecological environment quality (0.296810)	Air quality (0.0164542)	PM10 concentration (mg/m <sup>3</sup> )	Negative indicator	0.006115
		Annual average concentration of sulfur dioxide (mg/nf)	Negative indicator	0.006742
		Annual average concentration of nitrogen dioxide (mg/m <sup>3</sup> )	Negative indicator	0.003598
	Industrial pollution (0.0253329)	Industrial wastewater discharge (10,000 tons)	Negative indicator	0.029377
		Industrial wastewater discharge standard (10,000 tons)	Negative indicator	0.021349
		Chemical oxygen demand emissions (10,000 tons)	Negative indicator	0.034095
		Ammonia emissions (ten tons)	Negative indicator	0.112725



		Industrial exhaust emissions (ten thousand tons )	Negative indicator	0.010617
		Sulfur dioxide emissions (ten thousand tons )	Negative indicator	0.033598
		Smoke (powder) dust emissions (10,000 tons)	Negative indicator	0.011429
		Industrial solid waste production (10,000 tons)	Negative indicator	0.000140
		Comprehensive utilization of solid waste (%)	Positive indicator	0.000519
	Life pollution (0.000542)	Urban domestic sewage treatment rate (%)	Positive indicator	0.000023
		Harmless treatment rate of domestic garbage (%)	Positive indicator	0.014722
	City greening (0.026483)	Green area of the built-up area (hectare)	Positive indicator	0.008637
		Per capita park green area (m <sup>2</sup> )	Positive indicator	0.003125
		Green coverage rate of built-up area (%)	Positive indicator	0.001404
Urban and rural overall quality (0.027060)	Income Gap (0.006765)	Per capita income ratio of urban and rural residents	Negative indicator	0.009495
	Living standard gap (0.009495)	Engel coefficient ratio between urban and rural residents	Moderate indicator	0.001645
	Medical security gap (0.001645)	New rural cooperative medical participation rate (%)	Positive indicator	0.014516
	Employment gap (0.014516)	Proportion of rural non-agricultural employees (%)	Positive indicator	0.003439
Basic public service quality (0.518378)	Basic education service (0.057551)	Number of full-time teachers per 10,000 students(person / 10,000 people)	Positive indicator	0.014890
		Number of schools per 10,000 students(one school/ 10,000 people)	Positive indicator	0.014890
		Per capita budgetary education funding (yuan)	Positive indicator	0.039223
	Medical service (0.184529)	Number of health institutions per 10,000 people(unit/ 10,000 people)	Positive indicator	0.119219
		Number of health technicians per 10,000 people(person / 10,000)	Positive indicator	0.016903



		people)		
		Number of practicing (assistant) physicians per 10,000 people (person/ 10,000 people)	Positive indicator	0.020705
		Number of beds per 10,000 medical institutions (Zhang/10000)	Positive indicator	0.016063
		Per capita health care expenditure (yuan)	Positive indicator	0.011639
	Employment Services (0.017959)	Urban unemployment rate (%)	Negative indicator	0.004686
		Average wages of employees in urban non-private units (yuan)	Positive indicator	0.013274
	Social security service (0.183464)	Comprehensive coverage of medical insurance society (%)	Positive indicator	0.011627
		Comprehensive coverage of pension insurance society (%)	Positive indicator	0.022024
		Unemployment insurance social comprehensive coverage (%)	Positive indicator	0.043502
		Minimum living security social coverage (%)	Positive indicator	0.034165
		Number of social welfare institutions per 10,000 population (one per person)	Positive indicator	0.072147
	Other public facilities services (0.074873)	Per capita residential floor area (m <sup>2</sup> )	Positive indicator	0.006817
		The number of buses per 10,000 people (vehicles per 10,000 people)	Positive indicator	0.004400
		Every hundred people in the public library collection (book / 100 people)	Positive indicator	0.048656
		Internet coverage (%)	Positive indicator	0.002723
		Per capita road area (m <sup>2</sup> )	Positive indicator	0.007195
		Gas penetration rate (%)	Positive indicator	0.005082





### 3.1 DETERMINATION OF INDICATOR WEIGHT

According to the previous research results and literature review, this paper adopts the entropy method to determine the weight of the indicators. The entropy method is an objective method of weighting, which effectively eliminates the influence of human factors, and the reliability of the weighting result is higher<sup>[32]</sup>. The entropy method is to determine the weight according to the degree of dispersion of the index. The smaller the information entropy of the indicator, the larger the amount of information provided. Conversely, the larger the information entropy, the smaller the amount of information provided.

#### Standardization of indicators

In order to eliminate the difference between the positive and negative orientations of the magnitude, dimension and index of each index, the data should be standardized first, and the normalized formulas of the positive and negative indicators are processed as follows. The larger the indicator value indicates the better the quality of the new urbanization development, the standardization formula is used to standardize:

Positive indicator  $X_{ij} = \frac{X_{ij} - \min\{X_j\}}{\max\{X_j\} - \min\{X_j\}}$ ; ( $i=1,2,\dots,m; j=1,1,\dots,n$ )

The smaller the indicator value indicates the better the quality of the new urbanization development, the standardization of the negative index calculation formula:

Negative indicator  $X_{ij} = \frac{\max\{X_j\} - X_{ij}}{\max\{X_j\} - \min\{X_j\}}$  ( $i=1,2,\dots,m; j=1,1,\dots,n$ )

- Calculate the proportion of the index of the j-th item in the i-th town

$$Z_{ij} = \frac{X_{ij}}{\sum_{i=1}^m X_{ij}}$$

- Calculated index information entropy

$$P_j = -\frac{1}{\ln m} \sum_{i=1}^m Z_{ij} \ln Z_{ij}$$

- Calculating information entropy redundancy

$$D_j = 1 - P_j$$

- Calculating indicator weights

$$W_j = D_j \div \sum_{j=1}^n D_j$$



- Calculate the quality of urbanization in the i-th town

$$F_i = \sum_{j=1}^n W_j Z_{ij}$$

\*note:the number of indicators, m:town number

### 3.2 DATA SOURCES

This paper selects 13 towns in Zhuzhou City, Chengdu City, Beijing and surrounding areas as the research object of multi-channel urbanization quality evaluation system. All data are from the China County Statistical Yearbook and the statistical bulletins of the relevant township governments. In the multi-channel urbanization quality assessment index system given in Table 1 of this paper:

**The A layer is the target layer:** The assessment of the multi-channel urbanization quality indicator system is the overall goal.

**The B layer is the comprehensive evaluation layer:** It is mainly divided into five aspects: population urbanization, economic development quality, ecological environment quality, urban and rural overall quality, and basic public service quality. It is selected as a comprehensive evaluation factor.

**The C layer is the factor evaluation layer:** For the comprehensive evaluation layer, the supplementary comprehensive evaluation factors are analyzed from the five aspects of population urbanization, economic development quality, ecological environment quality, urban and rural overall quality, and basic public service quality.

**The D layer is the indicator evaluation layer:** Considering the five aspects of the comprehensive evaluation layer, a total of 51 indicators were selected for specific evaluation.

### 3.3 APPLICATION OF MULTI-CHANNEL URBANIZATION QUALITY EVALUATION INDEX SYSTEM

The purpose of building an indicator system is to apply it in practice. Therefore, the author selects 13 cities and towns in Zhuzhou City, Chengdu City, Beijing and surrounding areas for empirical research. When selecting case cities and towns, this paper will firstly predict the urbanization mode of selected cities according to the local government's urban construction planning. Select a characteristic town that is mainly driven by the secondary and tertiary industries to promote urbanization (Table 2).



Table 2: Judgment of urbanization patterns in various towns

Administrative level	Case	Urbanization model	Town
Ordinary prefecture city	Zhuzhou City (Central)	Tourism urbanization	Xianyu Town
			Jiujiang Town
		Business-oriented urbanization	Baitutan Town
			Huangtuling Town
Capital city	Chengdu (West)	Tourism urbanization	Street Town
			Anren Town
		Real estate urbanization	Garden town
Agricultural urbanization	Wanchun Town		
Capital city	Beijing (East)	Tourism urbanization	Shidu Town
		Science and education urbanization	Shahe Town
		Agricultural urbanization	Panggezhuang Town
		Real estate urbanization	Dongxiaokou Town
		Traffic urbanization	Gu'an Town

Based on the above data, the urbanization model of each case town is judged, and the data of 2016 is used to analyze from five dimensions (Table 3).

Table 3: Comprehensive scores of indicators in each case town

Town	Population urbanization	Ranking	Economic development quality	Ranking	Ecological environment quality	Ranking	Urban and rural overall quality	Ranking	Basic public service quality	Ranking	Urbanization quality	Ranking
Panggezhuang Town	0.002226	2	0.020925	2	0.043560	2	0.003971	2	0.076078	2	0.146761	2
Shahe Town	0.002135	3	0.020065	3	0.041769	3	0.003808	3	0.072950	3	0.140726	3
Dongxiaokou Town	0.001371	4	0.012888	4	0.026829	4	0.002446	4	0.046858	4	0.090393	4
Jiujiang Town	0.001024	5	0.009626	5	0.020039	5	0.001827	5	0.034998	5	0.067514	5
White rabbit Tan Zhen	0.000899	6	0.008450	6	0.017591	6	0.001604	6	0.030723	6	0.059268	6
Xianyu Town	0.000897	7	0.008433	7	0.017556	7	0.001601	7	0.030661	7	0.059147	7



Huangtuling Town	0.000817	8	0.007682	8	0.015991	8	0.001458	8	0.027929	8	0.053877	8
Wanchun Town	0.000736	9	0.006920	9	0.014406	9	0.001313	9	0.025160	9	0.048536	9
Street town	0.000690	10	0.006489	10	0.013509	10	0.001232	10	0.023593	10	0.045514	10
Gu'an Town	0.000678	11	0.006371	11	0.013263	11	0.001209	11	0.023163	11	0.044684	11
Garden town	0.000670	12	0.006295	12	0.013104	12	0.001195	12	0.022885	12	0.044148	12
Anren Town	0.000624	13	0.005863	13	0.012205	13	0.001113	13	0.021315	13	0.041119	13

Judging from the comprehensive evaluation results, the comprehensive scores of the indicators in the 13 case cities and towns are higher in Shidu Town, Pangezhuang Town, Shahe Town and Dongxiaokou Town in Beijing, and the comprehensive scores in Zhuzhou City in the middle are moderate. The low ones are Wanchun Town, Jiezi Town, Anren Town, Garden Town in Chengdu, and Gu'an Town in Hebei Province near Beijing. The following will be based on the level of quality of each urbanization for specific analysis:

#### Towns with higher urbanization quality

Mainly for Shidu Town, Pangezhuang Town, Shahe Town and Dongxiaokou Town. Among them, the highest is Shidu Town (comprehensive score 0.158311, ranking 1), economic development quality index score 0.022572, ranking 1; ecological environment quality score 0.046988, ranking 1; population urbanization quality score 0.002402, ranking 1; basic public service quality Score 0.082065, sort 1; urban and rural overall quality score 0.0004284, sorted 1. It can be seen that the urban public service quality and ecological environment protection of Shidu Town are better. Compared with other case towns, the five dimensions of population urbanization, economic development quality and ecological environment quality are among the first.

Among the towns with higher urbanization quality, the lowest is Dongxiaokou Town (comprehensive score 0.090393, ranked 4th), the economic development level Dongxiaokou Town (comprehensive score 0.4693, ranking 1), economic development quality index score 0.012888, ecological environment The quality score is 0.026829; the population urbanization quality score is 0.001371; the basic public service quality score is 0.046858; the urban and rural overall quality score is 0.002446. It can be seen that the urban public service quality and ecological environment protection of Dongxiaokou Town are better. Compared with other case towns, the five dimensions of population urbanization, economic development quality and ecological environment quality are all on the middle level.

#### Towns with medium urbanization quality

Mainly for Jiujiangjiang Town, Baitutan Town, Xianyu Town and Huangtuling Town. Among the towns with medium urbanization quality, the highest is Jiujiangjiang Town (comprehensive



score 0.067514, ranking 5th), the economic development quality index score is 0.0096226, the ecological environment quality index score is 0.020039, the population urbanization quality index score is 0.001024, the basic public The service quality index score is 0.034998 and the urban and rural overall quality index score is 0.034998. The five major indicators are at a medium level. It can be seen that although Jiujiang River Town is a town that develops tourism, in the past, although the development of the industry has improved the quality of basic public services, it has not paid enough attention to the urban environment and overall urban and rural development. In order to better develop tourism, the local government still needs to increase investment in urban environment improvement.

Among the towns with medium urbanization quality, the lowest is Huangtuling Town (comprehensive score 0.053877, ranked 8th), the economic development quality index score is 0.007682, the ecological environment quality score is 0.015991; the population urbanization quality score is 0.000817; the basic public service quality The score is 0.027929; the urban and rural overall quality score is 0.001458. It can be seen that the town of Huangtuling, which is dominated by the commerce and trade industry, has performed well in the quality of basic public services. However, the population urbanization process in Wangtuling Town is slow.

#### **Towns with lower urbanization quality**

Mainly for Wanchun Town, Jiezi Town, Gu'an Town, Garden Town and Anren Town. Among them, Wanchun Town's urbanization comprehensive quality score is 0.048536, sorted by 9. Its population urbanization quality, score 0.000736, and economic development quality, score 0.006920, ecological environment quality, score 0.014406, urban and rural overall quality score 0.001313; basic public service quality index score 0.025160. Wanchun Town is a development model of urbanization dominated by the real estate industry. With the development of local urbanization, the quality of urban and rural integration is relatively poor, and there is still a large gap between urban and rural residents' income, local residents education, medical care, Other benefits such as employment and social security have not been greatly improved, and the government has invested less in the construction of basic public service facilities.

The overall quality score of urbanization in Gu'an Town is 0.044684, ranking 11. In the process of urbanization development, Gu'an Town has poor overall quality, weak promotion of economic development, and great damage to the ecological environment. The green coverage rate of the built-up area is seriously insufficient, and the government has less investment in basic public service construction. The urbanization process of the population is slow. The quality of urban and rural development in Gu'an Town is also at a low level.

The lowest quality score of urbanization is Anren Town, only 0.041119, ranked 13. Anren Town is an urbanization model featuring the development of ancient town tourism. It mainly relies on tourism resources such as Anren ancient town and museum town in the town to attract tourists. The quality of the ecological environment in Anren Town is good, with a score of 0.012205; the quality of population urbanization is poor, with a score of 0.000624. The quality of urban and rural planning and the quality of basic public services in Anren Town are also poor. The gap between the medical security of villagers and urban residents is large. The government is not investing enough in infrastructure construction. The education, health care, employment



services, social security services, etc. The quality improvement is slow, and the quality of life of residents has not been greatly improved. Anren Town relies on tourism income to have a certain growth in the economy, but it is not obvious. The economic development quality score is 0.005863, ranked 13th, which is the lowest among all the towns in all cases. It can be seen that the development of tourism in Anren Town has not brought about a big increase in the local urban economy. It still needs the government to strengthen guidance and attract more tourists.

### Tourism consumption

The average scores of the indicators in each case town are obtained, and the scores of urbanization quality indicators of different modes are obtained, as shown in the following table:

Table 4: Different models of urbanization quality indicators score

Urbanization model	Population urbanization	Ranking	Economic development quality	Ranking	Ecological environment quality	Ranking	Urban and rural overall quality	Ranking	Basic public service quality	Ranking	Urbanization quality	Ranking
Real estate urbanization	0.001021	4	0.009592	4	0.019967	4	0.001821	4	0.034872	4	0.067271	4
Traffic urbanization	0.000678	6	0.006371	6	0.013263	6	0.001209	6	0.023163	6	0.044684	6
Science and education urbanization	0.002135	1	0.020065	1	0.041769	1	0.003808	1	0.072950	1	0.140726	1
Tourism urbanization	0.001127	3	0.010597	3	0.022059	3	0.002011	3	0.038526	3	0.074321	3
Agricultural urbanization	0.001481	2	0.013923	2	0.028983	2	0.002642	2	0.050619	2	0.097649	2
Business-oriented urbanization	0.000858	5	0.008066	5	0.016791	5	0.001531	5	0.029326	5	0.056573	5

It can be seen from the above table that the comprehensive score of the urbanization of science and education is the highest, totaling 0.140726, ranking 1; followed by agricultural urbanization, the comprehensive score is 0.097649, ranking 2; the comprehensive score of tourism-type urbanization is 0.074321, ranking 3; The comprehensive atmosphere of real estate-type urbanization is 0.067271, sorted 4; the comprehensive score of tourism-type urbanization is 0.074321, ranking 5; the lowest score is traffic-oriented urbanization, only 0.044684.

Taking the urbanization model as the independent variable and the scores of each index as the dependent variable, the following results were obtained by the SPSS software's multivariate analysis of variance, as shown in the following table:

Table 5: Differences in scores of urbanization quality assessment indicators for different models



Impact indicator	Urbanization model	
	F value	Sig.
1. The quality of population urbanization	0.647	0.673
2. Quality of economic development	0.648	0.673
3. Ecological environment quality	0.648	0.673
4. Urban and rural overall quality	0.648	0.673
5. Basic public service quality	0.648	0.673

Note: \*Significance is at the level of 0.01-0.05, \*\* is significantly below the level of 0.01.

It can be seen from the above results that there is no significant difference between the urbanization quality assessment indicators among different urbanization models, that is, the quality of urbanization development in each case is not significantly related to the urbanization development model.

Taking the region as the independent variable and the scores of each index as the dependent variable, the following results were obtained by the SPSS software's multivariate analysis of variance:

Table 6: Differences in scores of urbanization quality assessment indicators in different regions

Impact indicator	area	
	F value	Sig.
1. The quality of population urbanization	7.043	0.012
2. Quality of economic development	7.042	0.012
3. Ecological environment quality	7.042	0.012
4. Urban and rural overall quality	7.040	0.012
5. Basic public service quality	7.042	0.012

Note: \*Significance is at the level of 0.01-0.05, \*\* is significantly below the level of 0.01.

From the results of the above table, it can be seen that there are significant differences in the urbanization quality, economic development quality, ecological environment quality, urban-rural integration quality and basic public service quality in different urban areas during the development of the case.



### **3.4 EVALUATION RESULTS AND ANALYSIS**

On the whole, the quality of urbanization development is affected by many factors. In the process of urbanization planning and construction, we must comprehensively consider various factors, not only paying attention to urban economic development and population urbanization rate, urban ecological environment. Quality, basic public service quality and integrated urban and rural development also need to pay attention to a healthy and sustainable development path.

From the perspective of quantitative evaluation of indicators, the differences in urbanization quality between different models are not obvious, and the differences between regions are more obvious. In general, the quality of urbanization development in the eastern region is better than that in the central and western regions, and the level of urbanization development with higher administrative level is better than that at the administrative level. The difference in quality of urbanization development between regions is mainly reflected in the quality of ecological environment, the quality of urban and rural planning and the quality of basic public services.

## **IV. INSUFFICIENT AND SUGGESTIONS FOR MULTI-CHANNEL URBANIZATION INDICATOR SYSTEM**

### **4.1. INSUFFICIENT MULTI-CHANNEL URBANIZATION INDICATOR SYSTEM**

#### **Lack of solid theoretical support**

Establish an indicator system in a certain field. On the basis of the overall goal of clear evaluation, the basic theory of the field has a certain depth and breadth, and comprehensively grasp the basic situation of the descriptive indicator system in the field. At present, the research on the index system in China lacks the integration of theoretical knowledge. It can only be listed on the surface of the indicators, rather than the index system established under the theoretical support. The integration between the overall indicator systems is not high. This affects the overall effectiveness and accuracy of the indicator system.

#### **Evaluation index selection problem**

Since descriptive indicators are relatively easy to obtain, some research results neglect the development of evaluation methods for evaluation indicators. Some index systems can only be used to describe the trend of urbanization in a certain period of time, and it is impossible to make a specific evaluation. The indicator system is too large and lacks operability.





### **Partial static evaluation**

The existing indicator system has less or no consideration of the process of urbanization and lacks the stage and timeliness of urbanization. The study of multi-channel urbanization is a dynamic analysis of a country or region in the process of urbanization development, gradually determining its main development paths and trends, and timely adjustments in the actual development process. Therefore, in the process of designing the indicator system, the establishment of the indicator system should have the functions of description, detection, early warning and evaluation. It should pay attention to designing corresponding dynamic indicators to measure and evaluate the quality and level of multi-channel urbanization development.

### **Evaluation index system construction problem**

The research on the evaluation index of urbanization in China is mostly in the area above the county level, and most of them are based on the data provided by government departments. This affects the practicability of the construction of the indicator system to a certain extent, and the research method is relatively simple.

## **4.2 RELATED RECOMMENDATIONS**

Based on relevant theories, combined with multi-channel urbanization to emphasize the ultimate goal of “achieving the all-round development of mankind”, in the process of establishing urbanization quality evaluation index system, we should pay attention to the principle of selection: First, it can accurately and comprehensively reflect the economy. The characteristics and state of social and environmental development must be scientific and systematic; second, the selection of indicators should be based on relevant theoretical research, so that it is accurate, practical and operational. The third is to focus on the diversification and measurability of the source of the data while focusing on the natural ecological background of the region.

The construction and application of the multi-channel urbanization quality evaluation index system has important guiding significance for the urbanization development of the city. By using the multi-channel urbanization quality evaluation index system constructed, the leading driving force of urban development can be judged and the evaluation can be determined. The urbanization level of urban development, find out the root causes of the lack of urban development, and clarify the direction of optimization in the next step. To promote the city's economic development and the overall sustainable and coordinated development of the urban environment and infrastructure.



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