

Study on Urbanization Level of Shanxi Province

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Abstract—As a fundamental way to coordinate the integration of urban and rural areas, *Urbanization* symbolizes a country's modernization and social and economic development level. The urbanization of Shanxi Province is below the average level of China and has low quality. Therefore the method of measuring the urbanization level of Shanxi Province is important as well as fully understanding the current situation and existing problems of the urbanization in Shanxi Province. The article evaluates the current situation of urbanization in Shanxi Province from the perspective of urbanization rate, economic development condition, people's living conditions and infrastructure conditions by using principal component analysis. The results show that the quality of urbanization in Shanxi Province is low and the structure of urbanization is inappropriate. In the end, some suggestions are put forward for these specific problems.

Keywords—Shanxi Province; Urbanization; Principal component analysis

I. INTRODUCTION

Urbanization symbolizes a country's modernization and social and economic development level. It's an important driving force for the adjustment of industrial structure and a fundamental way to coordinate the integration of urban and rural areas [1]. Urbanization plays an irreplaceable role in promoting economic growth and improving people's living standards. Shanxi Province is a province in the central part of China. Its urbanization level reflects the economic, social, cultural and environmental development of Shanxi Province. Therefore, the urbanization level of Shanxi Province is measured by scientific method. System research and discussion on Shanxi Province urbanization level for the transformation of economic development and construction has very important practical significance, helps to suit the remedy

to the case, find out the countermeasures to solve the problem, to Shanxi Province urbanization level and the improvement of quality. This will have a qualitative leap to the economic growth of Shanxi Province. Therefore, it is necessary to study the urbanization level of Shanxi Province.

This paper makes an overall assessment of the quality of urbanization in Shanxi Province from the aspects of urbanization rate, economic development, people's living conditions and infrastructure conditions. After 11 cities as the research object, the search for the population, economy, people's life of index data, using principal component analysis on the 17 cities in Shanxi Province urbanization level to score. The status quo and existing problems of urbanization in Shanxi Province are analyzed. According to the problems in the process of urbanization in Shanxi Province, the corresponding Suggestions and countermeasures are put forward, hoping to provide some help to the urbanization development of Shanxi Province.

II. STUDY ON URBANIZATION LEVEL OF SHANXI PROVINCE

A. Analysis on the comprehensive development level of urbanization in Shanxi Province

In recent years, the economic development level of Shanxi Province has been rising steadily, and the urbanization level has also been developing rapidly. By the end of 2015, China's urbanization rate had reached 56.10%, and that of Shanxi Province was 55.02%. The urbanization development level of Shanxi Province was still 1.08 percentage points lower than the national average. In 2015 rankings of urbanization in the 31 provinces and cities nationwide, Shanxi Province ranks 16th, urbanization rate in the lowest level, our province and the rest of the developed province urbanization level has obvious gap, specific ranking as shown in figure 1.

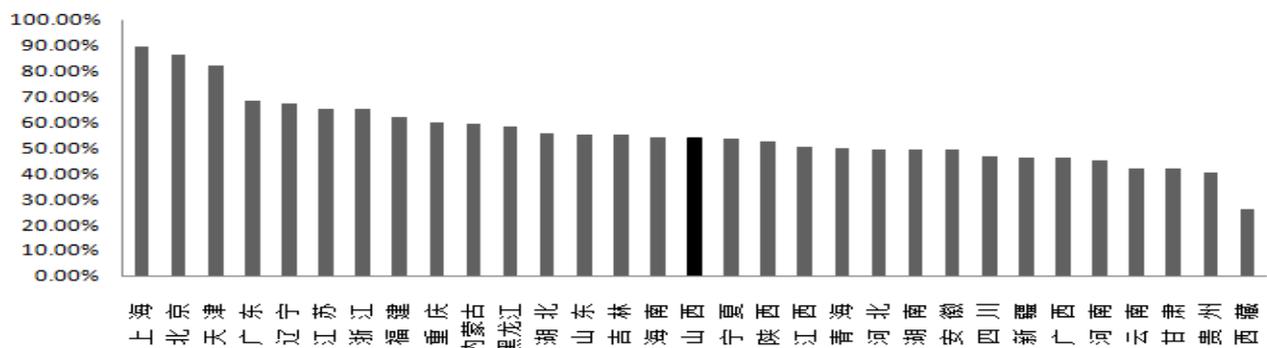


Fig. 1 Urbanization rate of 31 provinces and cities in 2015

B. Economic development status

From 2000 to 2000, Shanxi economy overall development level is relatively stable, GDP and per capita GDP rise year by year, in 2015 in Shanxi Province GDP amounted to 1.28026 trillion yuan, per capita GDP amounted to 35018 yuan. The regional GDP of Shanxi Province has been lagging behind the national average for many years, and the gap has been widening over time. The economic development level of Shanxi Province is still relatively backward.

C. People's living standards

In 2015, the average disposable income of urban residents in Shanxi province was 25,827.72 yuan, and that of rural residents reached 9,453.91 yuan. In 2015, the average income of urban residents nationwide was 31,194.83 yuan, while that of rural residents was 11,421.71 Yuan. It can be seen that people's living standards in Shanxi Province are lower than the national average. In addition, engel's coefficient can be used to comprehensively evaluate the living standard of a local people. According to the survey, the engel coefficient of urban and

rural households in 2015 was 25.2% and 29% respectively. Below the national average.

D. Current situation of infrastructure construction

The construction degree of a local infrastructure is an important index to evaluate the urbanization development of the region and a solid foundation for the stable and sustained economic development of a region [2]. In 2015, up to 20.26 billion yuan was invested in infrastructure projects in Shanxi Province. Investment in various kinds of infrastructure projects in our province increased by 10% compared with the growth rate in 2014, which occupies an important position in social investment. It can be seen from table 1 that the urban water use penetration rate and urban gas penetration rate of Shanxi Province are higher than the national average respectively. The data of the number of public transport vehicles, the area of roads and the area of parks and green areas per capita in Shanxi Province are still lower than that of the whole country.

TABLE I MUNICIPAL FACILITIES LEVEL OF URBANIZATION IN CHINA AND SHANXI PROVINCE IN 2015

Index	Urban water penetration rate (%)	Urban gas penetration rate (%)	Public transport vehicles per 10,000 people (beacon)	Per capita urban road area (m2)	Per capita park green area (m2 / person)
Nationwide	98.07	95.30	12.99	15.34	14.12
Shanxi	97.26	95.18	10.01	15.26	13.35
Shanxi/Nationwide	0.99	0.99	0.77	0.99	0.94

The data come from the urban and rural construction statistical yearbook

III. EVALUATION ON THE COMPREHENSIVE DEVELOPMENT LEVEL OF PREFECTURE-LEVEL URBANIZATION IN SHANXI PROVINCE

A. Comprehensive evaluation system index system construction and index selection

This paper respectively from the population, economy, people's life and the environment in 11 cities in Shanxi Province the aspects of urbanization comprehensive development level

Evaluation [3], constructs the elements from the system layer, layer and index layer three aspects, such as index system framework, specific see table 2.

TABLE II EVALUATION INDEX SYSTEM OF URBANIZATION

System layer	Element Layer	Index layer	
urbanization level	Urbanization of population	Urbanization rate X1	
		Urban employees/Total employees X2	
		Population density X3	
	Economic urbanization	X4	The proportion of non-agricultural workers
			Average GDP X5
			Industrial output/GDP X6
			Output value of secondary industry and tertiary industry /GDP X7
			The secondary industry accounts for the proportion of fixed asset investment X8
			The tertiary industry accounts for the proportion of fixed asset investment X9
			Urban disposable income X10
	Lifestyle urbanization		The per capita consumption expenditure of urban resident X11
			The number of high school students per thousand X12
			The number of cars per person X13
			Total Social Retail Sales X14
			The number of beds per thousand people X15
			Internet broadband access users X16
			Highway mileage X17
	Infrastructure urbanization		The number of buses operated by buses X18
			Urban road area at the end of the year X19
			Total urban water supply X20
			Green coverage area of built-up area X21
			Sewage disposal rate X22
			The number of days the air quality meets the standard X23
Environmental urbanization			

B. Measurement method of comprehensive development level of urbanization in Shanxi Province

Software for the SPSS22.0 11 provincial level city comprehensive analysis to evaluate the degree of urbanization development, principal component analysis is adopted in the analysis of the review process for each variable object for data analysis [4].

1) Dimensionless original data

First of all, the raw data of 11 cities are dimensionless, which reduces the data difference and makes the data distribution stable to a certain extent. The method of data dimensionless processing is as follows.

$$Y_{ij} = (V_{ij} - \mu_i) / (V_{imax} - V_{imin})$$

In the formula, V_{ij} is the original data of the j sample city of item i evaluation index. μ_i is the average value of the i evaluation index. V_{imax} is the maximum value of the original data of item i evaluation index of the sample city. V_{imin} is the minimum value of original data of item i evaluation index of

sample city. Y_{ij} is the index utility value of the j sample city of item i evaluation index.

2) Variance analysis and score calculations

Using SPSS22.0 the standardized data processing software, and then principal component analysis was carried out on the

standardization of data can get the characteristic value and the variance contribution rates of the principal component, load matrix of principal component and principal component score coefficient matrix.

TABLE III CHARACTERISTIC VALUE AND VARIANCE CONTRIBUTION RATE

Component	Initial eigenvalue			Extract the squares and load			Rotate the sum of squares and load			
	Total	The variance	%	Accumulation%	Total	The variance %	Accumulation %	Total	The variance %	Accumulation %
1	12.069	52.474	52.474	12.069	50.474	50.474	10.42	45.323	45.323	4
2	4.220	18.347	79.822	4.220	18.347	70.822	4.337	18.858	64.181	
3	2.791	12.133	82.955	2.791	12.133	82.955	3.794	16.497	80.678	

Data source: the original data was sorted out by SPSS22.0

From table 3 you can see all the eigenvalues of the first three principal component values greater than 1 and the cumulative variance contribution rate accounts for 82.955% of total variance contribution rate, namely the three main ingredients contain 82.955% of the original information. So the first three main components can be used to replace the original 23 variables, and the three main components can be named Y1, Y2 and Y3 respectively. The main component Y1 is called "total urban development factor", the main component Y2 is called "people's living standard factor", and the main component Y3 is called "environmental development factor".

The main component score of each city is calculated, that is, the product of factors explaining each component and corresponding coefficients. Thus the final total score of each city is calculated. The formula is used to calculate the comprehensive score. The formula is:

$$F = \sum F_i \times \beta_i.$$

Among them, F_i represents the score of main component Y_i , while β_i represents the weight of main component Y_i . The weight calculation method is the proportion of variance contribution rate of Y_i to the total variance contribution rate of the three principal components. The total scores of the 11 prefecture-level cities calculated are shown in table 4 below.

TABLE IV COMPREHENSIVE SCORE OF URBANIZATION LEVEL OF 11 PREFECTURE-LEVEL CITIES IN SHANXI PROVINCE IN 2015

City	Total score	Rank
Taiyuan	1.950723	1
Datong	0.127662	2
Jinzhong	0.04303	3
Yangquan	-0.08664	4
Yuncheng	-0.09399	5
Changzhi	-0.10254	6
Jincheng	-0.19766	7
Linfen	-0.23912	8
Shuozhou	-0.43743	9
Xinzhou	-0.49224	10
Lvliang	-0.60248	11

It can be seen from table 4 that the urbanization level of Shanxi Province 11 is generally not high, only three cities have a positive comprehensive score, among which Taiyuan city ranks among the top in the score of three main components. The remaining eight prefecture-level cities had negative urbanization levels, while the lowest three cities were Shuo Zhou, Xinzhou and Lvliang.

IV. CONCLUSION

A. Problems in the urbanization of Shanxi Province

1) Industrialization and urbanization are not in harmony

Industrialization has a very important role to the development of urbanization, industrialization to promote the development of urbanization, urbanization provide advanced means of production, the coordinated development of the level of urbanization and industrialization should be good. The urbanization rate of Shanxi Province is increasing year by year, but the industrialization rate has been decreasing year by year since 2011, and the gap between the two is getting bigger. The difference was -7.9% in 2005, and by 2015 it had risen to 20.87%, contrary to Chenery's "development model". It can be seen that there is a problem of uncoordinated industrialization and urbanization development in Shanxi Province [5].

2) Obvious internal differences in the level of urbanization development

Taiyuan had the highest urbanization rate among prefecture-level cities in Shanxi Province in 2015, and its urbanization rate was 79.46%, far exceeding the national average urbanization rate and the average urbanization rate in Shanxi Province. The lowest urbanization rate in Shanxi Province is Luliang, with an urbanization rate of 46.24%, which is far behind that of Taiyuan. In the evaluation of the comprehensive development level of urbanization in prefecture-level cities of Shanxi Province, the difference between the highest score and the lowest score of the comprehensive development level of urbanization is 2.55, which is quite large. Therefore, it can be concluded that the urbanization development level of Shanxi Province is significantly different.

3) The low quality of the city

In terms of total urban development factor, people's living standard factor and environment development factor, at least 5-6 cities in Shanxi Province score negative in each factor. In the final comprehensive score of urbanization level, only 3 cities scored positively, while the remaining 8 cities scored negatively. It can be seen that the urbanization quality of Shanxi Province is not high.

B. Thinking on the urbanization development strategy of Shanxi Province

1) Optimizing the industrial structure of Shanxi Province and coordinating the development of industrialization and urbanization

The urbanization level of Shanxi Province is not in harmony with the industrialization level, and its tertiary industry structure is not reasonable, which seriously restricts the improvement of the economic development and urbanization level of Shanxi Province. Therefore, it is very important to adjust the industrial structure and coordinate the development of industrialization and urbanization. First of all, we can develop modern agriculture, learn from the American agricultural industrialization management mode, and play the role of the market in agricultural industrialization management [6]. The government should also provide support and assistance to the development of agricultural industrialization, mainly through organization and credit support. Second, we will promote the structural upgrading of the secondary industry and take the road of new intensive industries [7]. Third, we will increase support for the service sector in the tertiary industry and promote Shanxi as a tourist destination.

2) Increasing support for areas with low levels of urbanization and narrow regional differences in urbanization

The comprehensive development level of urbanization in prefecture-level cities in Shanxi Province is obviously different, and the cities with low urbanization rate are far lower than the average urbanization rate of Shanxi Province and the whole country. Cities with low comprehensive development level of urbanization include Yuncheng, Xinzhou, Linfen and Lvliang. The government should enhance the support to this a few cities, adjust measures to local conditions for development of local economy industry, focus on labor and resources to speed up the construction of the industrial garden, reasonably adjust the local industrial structure, giving full play to the advantages of the place [8].

3) Improving the quality of urbanization

In Shanxi Province urbanization should not only pursue the increase of urbanization rate of urbanization is not only on behalf of the urbanization of population, also on behalf of the economy, society, environment and people's life of urbanization. Therefore, in the process of accelerating urbanization, we will increase the security fund for people's livelihood, and take into account people's food, clothing, housing, transportation and other aspects to improve people's quality of life. To strengthen the construction of urban infrastructure, such as establishing the etheric part of good traffic network system, make people travel more convenient, promote the population, resource and the exchange of information, strengthen the radiation of the city [9]. Improving the ecological environment of the city. Reinforcing people's ideas about protecting the environment. We will improve the treatment technology of urban sewage and domestic waste, and increase the rate of sewage disposal and the rate of harmless disposal of garbage.

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