Research on the Prediction Method of Urbanization Population Size in Weifang of Shandong Province under the Integrated Development

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Abstract: Urban integration is a new stage in China's modernization and urbanization. Urban integration is a process that promotes the changes in production modes, lifestyles and living styles of urban and rural residents with the development of productivity, making urban population, technology, capital, resources and other elements are mutually integrated, mutual resources, mutual market, mutual service, and gradually achieve the process of coordinated development of economy, society, culture, ecology, space and policy between urban and rural areas. Under the background of integrated development, the urban population of Weifang in Shandong Province has undergone great changes. By comparing domestic and foreign scholars' research on predicting population size, the paper mainly discusses the changes of urbanization population in Weifang of Shandong Province.

Keywords: Weifang of Shandong; Population prediction; Method research

1. Introduction

With the development of the economy, in order to improve the quality of life, people have moved from rural areas to urban areas. In the current situation of population movement, it is urgent to strengthen the prediction of urban population. The methods of population prediction have existed since ancient times, and the population in successive dynasties has been regarded as the symbol of prosperity. It is the same today. We should combine the research methods of population size in ancient and modern China and foreign countries to predict the population under the development of urban integration, so as to formulate the corresponding sustainable development strategies. Mastering the exact population is of great significance to the construction, infrastructure, education and public service of cities and towns.

2. Research Results of Population Size Prediction

The concept of population has existed since ancient times. During the Warring States period, all countries fought for population. In ancient times, due to the limitations of productivity, population changes were mainly affected by war and the natural environment[1]. The ancient population is counted through the statistics method of one village by one village and one county by one county, and it was inevitable to make the information inaccurate. Especially after the natural disasters and man-made disasters,

population reduction and population mobility intensified, and the number of population was more difficult to predict. In modern society, with the development of science and technology, people have made great achievements in population size prediction. For example, Mr. Wang Lijian's prediction of the urban and rural population in Shaanxi Province. By constructing a model of urban and rural population, Mr. Wang Lijian analyzed the migration of urban and rural population in Shaanxi Province and the flow law of the overall population. He predicted the population of Shaanxi Province in accordance with ages. Through unremitting efforts, he successfully predicted the age change of urban and rural population in Shaanxi Province in the next 30 years. In the study of southern Jiangsu, according to the characteristics of market towns in southern Jiangsu, Mr. Yang Shan predicted the reasonable population of market towns after investigating the degree of population concentration, economic development situation and the number of a family, and combining with the changes of rural labor force population.

There are also research results on population size prediction abroad. Unlike domestic scholars' researches, foreign scholars' predictions about population are more from the perspective of urban sustainable development. For example, Brian Bailey analyzed nearly 100 countries and regions based on urbanization, and studied the factors affecting urbanization, and finally concluded that population changes are closely related to the city's economy, education level and urbanization rate. Slyther's

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research on the population is mainly focused on sustainable development. He suggested that the population changes must be in line with the local environmental carrying capacity. If the population size is greater than the environmental carrying capacity, the social economy will retreat. This kind of research method is of great significance for us to study the changes of population size under the background of integrated development.

From the research results at home and abroad, the focus of population size prediction is different, and both of them have problems. Firstly, most of the foreign researches focus on the perspective of urbanization when predicting population; secondly, most of the domestic researches are mainly carried out in big cities, and the research on population size of small cities is lack of strength; thirdly, the research results lack specific processes, which present the results that have been studied and lack credibility.

3. The Research Method of Urban Population Size under Integrated Development

In the process of urban integration development, we should attach importance to "people" and adhere to the concept of "people-oriented". The original intention of urban integration is to provide people with a happier and more convenient living environment. Especially in rural areas where education is backward and medical facilities are not perfect, we should promote the development of urban integration, shorten the gap between urban and rural areas, and promote the common progress of the whole society. [2] At the same time, in the process of integration, the population flow should be dealt with in a timely manner, and the scientific population prediction method should be applied to grasp the urban population changes. Generally speaking, the traditional methods of population size prediction mainly adopt the average growth method, the comprehensive growth method, and the labor balance method. For example, the specific method of the labor balance method is to calculate the absolute number of the basic population in the development of the national economy, and then to predict the future population size of cities and towns based on the labor force of current population. The basic principle of this method is "to predict the changes of future population size by calculating the overall population and then by analyzing the proportion of labor force." The premise of applying this principle is that social development is relatively stable and the proportion of the population does not change greatly in a period of time. With the integration of cities and towns, the integration of agriculture and industry, the integration of cities and villages, and the change of social labor structure, the traditional methods represented by the labor ratio method have great limitations.

The modern research methods of population size prediction mainly include moving average method, environmental capacity method, exponential smoothing method and so on. [3] For example, the principle of environmental capacity method is to summarize the resources of society generally, and then estimate the population carrying capacity of various resources, including the land carrying capacity adapted to economic development, the land carrying capacity under the appropriate population density, the land carrying capacity of a certain degree of labor force population, the utilization rate of water resources, the average distribution rate of living resources and so on. According to the barrel effect, the growth of the final population size is limited by its shortcomings. In addition, according to the moving average method of mathematical formula, the statistics of the population change of a city in a certain period of time is made, and then after a certain period of time, the population change is counted again, so the statistical comparison is made one by one. Through the population growth change of the same period of time, the average of population change can be calculated, and the trend of future population change can be predicted with the calculated average.

In addition to the above methods, there is also a need to rely on a large amount of human and financial support, such as the system dynamics prediction method. This similar method requires not only professional knowledge, but also the cooperation of various resources, which in not widely applied in the research of population size prediction.

4. The Choice of Research Methods for Urban Population Size under integrated Development

When researching the size of urban population, we should first understand its urban history and grasp its population changes with a long-term perspective[4]. The economy of Weifang in Shandong Province is developed. In recent years, it has vigorously promoted the process of urban integration under the slogan of "breaking through the seashore, upgrading the urban areas and developing the two rivers". In the process of integration, it has always adhered to the people-oriented principle, aiming at realizing the goal of "establishing livable communities with complete functions, comprehensive living services, safe infrastructure, sound governance mechanisms and distinctive characteristics". In 2018, the urban permanent resident population and urban household registration rate of this city have approached 60%. For predicting the urban population with high urbanization rate such as Weifang, it can be predicted by the comprehensive growth method and the above-mentioned environmental capacity method and labor balance method. The comprehensive growth method is the basic method of population prediction. It calculates the average growth rate by calculating

the actual growth rate of the current resident population and the previous year's population in Weifang, then multiplies it with the predicted period, and adds the number of mechanical growth per year, which is the final result of the comprehensive growth method.

In the development process of Weifang's urban integration, the city's resource supply is inseparable. In the process of development, we should comprehensively use its resources to achieve healthy and sustainable development of the city. Weifang is located in the central part of Shandong Province, and its terrain increases from north to south. In 2018, its total population has reached 9.5 million. In the process of urban integration, Weifang pays great attention to protecting natural resources and building ecological civilization, and has won the China Habitat Environment Award in environmental protection. The city is rich in natural resources and the national protected gardens. Most areas of Weifang are plains and hilly lowlands. According to the analysis of land index suitable for human habitation, the suitable degree of natural topography in Weifang is more than 50. In consideration of the occupation of farmers' land, highways, trains, and airplanes in Weifang, the land resource capacity of Weifang is relatively high. At the same time, there are six large freshwater rivers around Weifang City. Moreover, because of the special terrain of low north and high south, the annual precipitation is mostly circulated in the city, and the annual precipitation in the urban area is 3% more than that in the whole province. In different seasons, the runoff of rivers is also different. In the peak season, the maximum runoff of the rivers is 253 mm, while in the off season, it is only less than 50 mm. Because of the influence of geographical factors, the runoff of the rivers varies from north to south. The maximum difference between north and south is 240 mm, which is close to 3 times. The average annual runoff in Weifang is 3 billion cubic meters. The distribution of its water resources affects the flow of the population to some extent. Weifang is rich in mineral resources, and more than 50 valuable mineral resources have been found in its region. There are nearly 300 mineral areas in the whole city. The main minerals are gold, silver and black iron. Its iron ore resource reserves are huge, so the use of environmental capacity method combined with the supply of major resources can predict changes in population size.

With the development of urban integration, Weifang's industrial structure is also closely integrated. The GDP of Weifang has reached 615.68 billion yuan in 2018, with an economic growth rate of 6.5%[5]. The growth of the primary industry is relatively low; the economic growth of the secondary industry and the tertiary industry is relatively high. This also brings a series of problems. The primary industry is mainly based on agriculture, which needs more labor force. The second and tertiary industries are industries and services, which need less labor force. With the adjustment of the industrial structure, the overall demand for labor force in the society has gradually declined. We count the changes in the quantity of labor force, and calculate the proportion of labor force in the total population of the society according to the labor balance method, so as to predict the further changes in the size of the population.

The above three methods of predicting population can predict the urbanization population of Weifang in different aspects. In the process of practice, by comparing the results of the three prediction methods, the future changes of urbanization population in Weifang can be predicted more accurately.

5. The Insufficiency of the Research on urban Population size at the present Stage

Although the current known population prediction methods can be perfected in theory, there are still some shortcomings that need to be resolved in the specific urban population research. Firstly, when applying the known research methods, due to their theoretical composition has their own characteristics, and their applicable conditions are also different, so in the current theoretical method research, they are often applied directly to the prediction of urbanization population and the methods are not carried out in-depth research. Therefore, if we do not distinguish them in the prediction of specific cities or towns, it is easy to lead to wrong prediction results. Secondly, with the rapid development of the economy, the social industrial structure, life rhythm, living habits and other aspects are undergoing drastic changes, and the corresponding factors affecting urban development are more difficult to determine. This makes it more difficult to predict future population changes correctly under uncertain conditions. Thirdly, many research methods at this stage are based on the selection of survey parameters. The parameters are often collected from different people and different ages. The data are more or less biased. Moreover, due to the lack of attention to population prediction research, the development of basic research is relatively backward, many data are estimated based on historical experience, and the prediction results are also lack of scientific. Fourth, although research methods are reasonable to some extent, there are often other unrestricted factors in the practice that affect the population size, such ad the influence of national policies. The population growth of a region, the nation has macro regulations, and the nation's household registration management system for population movements also limits population changes to a certain extent. There are also urban traffic factors, public service factors, educational factors, and so on. These factors are easily neglected in theoretical research. Therefore, it is necessary not only to adopt the correct method to predict the size of the urban population, but also to carry out comprehensively evaluation

in combination with the factors of local politics, economy, and infrastructure services.

6. Conclusion

This paper summarizes the specific methods of population prediction by analyzing the research results of population prediction and understanding the current research situation at home and abroad. On this basis, taking Weifang of Shandong Province as an example, it uses specific research methods to predict the change of urban integration population size. Finally, it summarizes the shortcomings of the application of theoretical methods to specific practice, and puts forward some suggestions for improvement.

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