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New Rural Housing Construction

Zhexuan Hong[1]

[1]Yanbian University, Yanji, China

*Correspondence: zhong1980@gmail.com

ABSTRACT

Based on the background of the change in the urban–rural relationship in Guangdong Province, this paper constructs an analysis framework of urban and rural coordination development. Using the data of 19 administrative units above prefecture level in Guangdong Province, this paper studies the space–time evolution of urban and rural coordination development during 2000–2015 through Principal Component Analysis (PCA) and Exploratory Spatial Data Analysis (ESDA) and explores the influencing factors and driving forces behind it. It is found that there is club convergence in the urban and rural coordination development in Guangdong Province. This kind of convergence is reflected in the findings that the east bank of the Pearl River estuary is the best area for the urban and rural coordination development where Guangzhou, Dongguan, Shenzhen is the core and the level of urban and rural coordination development in the east, west and north of Guangdong Province is relatively low, which also reflects a geographical polarization feature. Based on the analysis of the factors that promote the urban and rural coordination development in the main years of 2000–2015, it can be concluded that location, economic development and urbanization level are the most important driving forces, followed by industrial structure. This research can be used as a decision-making reference for urban and rural coordination development and new countryside construction in China in the New Era.

1. Introduction

According to the development experience of a large number of countries and regions globally, the evolution process of urban–rural relationships has common features; that is, it takes on specific charac- teristics overtime. In the early stage of development, there is a special binary opposition between urban and rural areas. Cities absorb a large amount of rural labor through the industrialization process and the gap between urban and rural areas gradually becomes prominent[1-7]. With the process of industrialization, cities further spread their development effects to the countryside and drive rural development, gradually forming the "core-periphery", "growth pole" and "circle layer" models. With fur- ther improvement of the urbanization level, therela- tionship between cities and between urban and rural areas is strengthened. Concepts of urban agglomera- tions have formed in different countries and regions, such as "Desakota", Megalopolis and Ecumenopolis. In addition, many scholars believe that because of continuous development and evolution of urban agglomerations, cities and rural areas will eventually be in a relatively harmonious relationship, which means adoption of an appropriate urbanization model could promote urban and rural coordination development. Through the optimal

allocation of various development factors and the optimal adjustment of the economic and social structure within urbanag- glomerations, the healthy development of the re- gional urbanization process can be promoted and thus play an important role of promotion across a larger region[7-12] .

Similarly, China's urban and rural development has also experienced a series of stages since the founding of the People's Republic of China. Before the Reform and Opening-up, due to the restrictions of a series of control measures, such as the planned economic system and household registration system, the production factors of population and capital were unable to flow freely between urban and rural areas and cities were unable to spread their industrialization achievements to the countryside. An obvious binary opposition structure existed between urban and rural area. After the Reform and Opening-up in 1978, with the formation of the market economy system and the implementation of the Opening-up policy, China entered the process of rapid marketization and urbanization. At this stage, cities and rural areas be- gan to develop together. As a result, a large portion of the rural labor force entered cities to engage in non-agricultural industries. In addition, the government began to pay attention to the development of rural areas and encouraged rural township enter-prises to develop non-agricultural industries[13- 16].

In addition to the above common factors, China has unique problems in the process of urban and rural development. After more than 30 years of rapid de-velopment, although the government intends to pro-mote development in the countryside, China's urban and rural development has not naturally transitioned to a scenario in which urban areas support the coun- tryside. In contrast, a large number of conflicts exist in terms of development opportunities, resource ac- quisition and other factors that affect urban and rural society, economy, environment and so forth. These conflicts often lead to further social problems, such as loss of cultivated land and imbalance of the economic burden of urban and rural sewage treatmen Inaddition, even in the more developed urban agglomerations, differentiated spatial patterns exist. Therefore, the issue of urban and rural coordination development has become an important livelihood issue that concerns the Chinese governmentrategies of "urban and rural coordination development" and " new urbanization" were advanced, respectively. In addition, urban and rural coordination development has also become one of the main tasks of China's development in the New Era.

To date, numerous researchers have examined urban and rural coordination development, including investigations of theoretical combing. Liu et al. be-lieved that the coordinated development of urban and rural areas refers to the formation of a special rela tionship between urban and rural areas in terms of spatial distribution, economic investment, eco-environment and social services. Longetal. believed that the coordination

of urban and rural development refers to the distribution of regional resources between urban and rural areas. If the coordination of urban and rural development is high, resources can be evenly distributed between urban and rural areas, otherwise, cities will further deprive rural areas of development resources. Chen and Gao believed that urban and rural coordination development includes three dimensions, that is, the release of the rural labor force through land policy reform, the employment and citizenization of the rural labor force in the city and the effect of rural scale economies such as collective farms and agricultural mechanizations. Gross et al. believed that urban and rural coordination development means that residents may have different lifestyles in urban and rural areas but can enjoy similar basic living conditions; however, since the space-time evolution of urban and rural development is a dynamic process, the widely used GIS method is inappropriate for studying related issues.

In further research of the driving forces, as an extension tool of GIS, the cellular automata (CA) model has become the main tool for some scholars to study the dynamic changes in urban and rural areas. However, the CA model pays more attention to the monitoring and simulation of space-time changes and lacks the integration and explanation of driving forces. As a result, system dynamics (SD) modelling has been introduced into the research of related fields. This approach describes the complex interaction between each element by treating urban and rural systems as a set of interrelated elements. However, this method also has the disadvantage of lacking a spatial dimension in model variables.

In general, deficiencies remain in the existing research. First, although the indicators selected by scholars in the evaluation of urban and rural coordi-nation development level are appropriate driving forces of urban and rural coordination development, few scholars have considered the impact of spatial effects, which can result in deviation in the explora- tion of the driving force. Therefore, this paper constructs a comprehensive evaluation index system of urban and rural coordination development, evaluates the comprehensive level of urban and rural coordination development using the statistical data of 19 ad-ministrative units above the prefecture level in Guangdong Province, studies its spatial evolution pattern and explores the driving forces of urban and rural coordination development while taking thespatial effect into consideration. Finally, the results of this study provide the basis for policy making.

2. Literature review

Guangdong is a provincial administrative region of the People's Republic of China, located in South China, bordering HongKong and Macao, with a total land area of about 17,977 km2, a permanent population of about 115.21 million and 21 prefecture level cities, as shown in Figure 1. Considering the consistency and availability of

data, this paper de- fines 19 administrative units above the prefecture level in Guangdong Province as the research object. Guangdong Province has one of the highest degrees of openness and the strongest economic vitality in China. Since 1989, Guangdong's GDP has ranked first in China. Guangdong thus became China's largest economic province, accounting for 1/8 of the country's total economic output and reached a level equivalent to that of middleland upperincome countries and middle-developed countries. The comprehensive competitiveness of the Guangdong provincial economy ranks first in China. Nine cities in the Pearl River Delta will connect with Hong Kong and Macao to comprise the Guangdong–Hong Kong–Macao Greater Bay Area, which will become one of the four major bay areas in the world, together with the New York, San Francisco and Tokyo bay areas. In 2019,Guangdong achieved a GDP of 10,767.107 billion yuan with an increase of 6.2% over the previous year. However, there are significant differences in the development inside Guangdong. In general, the development level of the Pearl River Delta is relatively high, while the development level of eastern, western and northern Guangdong is relatively low. These three regions have relatively low levels of urbanization. Thus, it can be seen that the development of urban and rural areas in Guang- dong is quite different. Rural development cannot be ignored because it is fundamental to the issues of agriculture, farmers and rural areas. Rural development also plays an important role in alleviating poverty. Because Guangdong Province has experienced an early and high degree of development, it is of great practical significance to study the province's urban and rural coordination development.
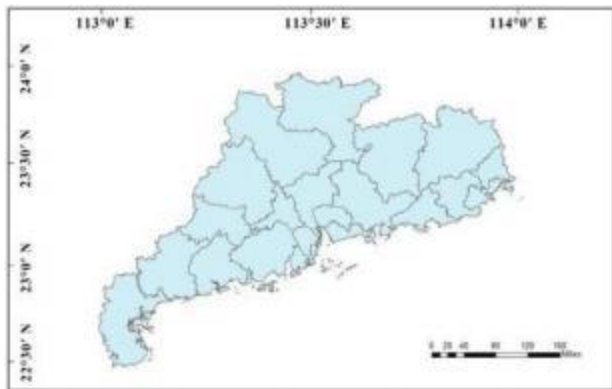

Figure 1. Guangdong Province.

3. Space-time Analysis

To effectively evaluate the actual level of urban and rural development, based on the specific data of 19 cities in Guangdong Province, PCA was implemented using SPSS. First, wepreprocessed the original data, that is, the forward and standardized data (in which the reciprocal method was used for the forward and the Z-fraction method was used for the standardization). Second, the model was calculated by the comprehensive

principal component evaluation value and extraction of the specific expression of them principal components Fi via PCA. Finally, the comprehensive level of urban and rural coordination development of 19 cities in each year was calculated according to the model.

There are numerous criteria for principal com ponent extraction. This study extracted principal components of variance decomposition according to the principle of eigenvalues greater than 1. In 2000, we extracted four principal components and the cu- mulative variance contribution rate was 73%, which passed the test of the above criteria. Principal component extraction in 2005, 2010 and 2015 also passed the above criteria. These results show that the extracted principal component contains most of the information of the 10 original index variables, thus demonstrating that PCA is suitable for evaluating the comprehensive level of urban and rural coordination development of 19 cities in Guangdong Province. To summarize, the standardized values of each city's indicators in each year were substituted into the evaluation value calculation model based on the PCA, as shown in Table 2 and the comprehensive level value and ranking of urban and rural coordination develop- ment of 19 cities in Guangdong Province in 2000, 2005, 2010 and 2015 were calculated.

In the scatter diagram, the horizontal axis represents the comprehensive level value of urban and rural coordination development and the vertical axis represents the spatial lag value. The upper left represents the LH area, which means a lower level of a city's own and a higher level of its surrounding areas, a higher degree of spatial difference between them and stronger spatial negative correlation, that is, prominent heterogeneity. The upper right is the HH area, which means a higher welfare level of a city's own and surrounding areas, a smaller degree of spatial difference between them and stronger spatial positive correlation, that is, the hot spot area. The lower left is the LL area, which means a lower wel- fare level of a city's own and surrounding areas, a smaller degree of spatial difference between them and stronger spatial positive correlation, that is, the blind spot area. The lower right is the HL area, which means a higher level of a city's own and a lower level of its surrounding areas, a higher degree of spatial difference between them and a stronger spatial negative correlation, that is, the prominent heterogeneity.

Take 2005 as an example. Five cities are located in the first quadrant (HH), namely, Guangzhou, Zhuhai, Foshan, Dongguan and Zhongshan. These cities and their surrounding areas have a high urban and rural coordination level and strong economic and social ties between urban and rural areas and belong to the high–high agglomeration spatial connection type. There are 10 cities in the third quadrant(LL),namely, Shanwei, Chaozhou, Zhaoqing, Yunfu, Maoming, Zhanjiang, Yangjiang, Heyuan, Meizhou and Jieyang. These areas are underdeveloped areas in the province with weak

urban–rural economic and social ties between themselves and adjacent areas and lower urban and rural coordination levels. Moreover, the level in the surrounding cities is also relatively low and these cities belong to the low-low agglomeration spatial connection type. The other cities are located in quadrants II and IV, which show negative spatial correlations. Cities located in quadrant II (Shaoguan, Qingyuan, Jiangmen and Huizhou) have a low urban and rural coordination degree, weaker urban-rural economic and social ties than adjacent areas and a lower urban and rural coordination level and thus belong to the low-high agglomeration spatial connection type. Located in quadrant IV (HL), Shantou's urban and rural coordination level isobviously higher than that of the surrounding areas, which belong to the high-low agglomeration spatial connection type. It was also found from the visualization of natural breakpoint method that Shantou was red.

From the overall analysis of the four figures, the proportions of HH and LL type cities were more than 60% in the four research periods, among which the proportion of LL type cities was the highest, reaching more than 50% in the first three periods. This shows obvious club convergence. The fact that most cities fell into the quadrants of HH and LL shows that the regional differences of urban and rural coordination in Guangdong Province have an obvious dual spatial structure. The hot spots of urban and rural coordina- tion development have always been in the Pearl River Delta, while the blind spots are mainly distributed in the eastern and western regions of Guangdong Province, which is consistent with the real regional differences in economic development in Guangdong Province. The urban and rural coordination development (at the municipal level) of Guangdong Province has a trend of polarization and is characterized by urban agglomeration with low urban and rural coordination level. From the perspective of the quantitative transformation relationship, the number of HH type cities was unchanged at five. The number of LL type cities was generally unchanged in the first three periods but decreased in 2015. As shown in the scatter diagram, the transformation from LL to LH took place.

4. Conclusions and Discussion

Based on the development and evolution of the relationship between urban and rural areas in Guang-dong Province, this study explored the level and dy-namic mechanism of urban and rural coordination development. In the evaluation of the urban and rural coordination development level and the dynamic mechanism, due to the fact that the urbanization rate of Shenzhen is 100% and the lack of data in Foshan, 19 cities in Guangdong Province were taken as the research object. This study constructed an evaluation index system, including the measurement of urban and rural coordination and the measurement of urban and rural development, which could effectively cover all aspects of urban and rural coordination.

According to the Principal Component Analysis (PCA), the URCD level of the 19 cities during four periods can be determined. In 2005, the coordination development gap between the highest scoring cities and the lowest scoring cities was small. In 2010, the gap widened but narrowed in 2015. This indicates that the urban and rural coordination development in Guangdong Province repeated. In terms of overall scores, the average scores of 19 cities in Guangdong Province in 2000, 2005, 2010 and 2015 were-0.326, 0.093, 0.112 and 0.637, respectively, indicating a significant upward trend.

Through the Exploratory Spatial Data Analysis (ESDA), it is concluded that in terms of the global spatial autocorrelation, there is a strong positive spatialautocorrelation in the level of urban and rural coordination development of each city in Guangdong Province; that is, cities with similar urban and rural coordination development levels tend to show spatial aggregation. From 2000 to 2005, the overall spatial difference of urban and rural coordination development levels in Guangdong Province tended to narrow. From 2005 to 2010, it narrowed more clearly. From 2010 to 2015, however, it tended to widen. In terms of spatial autocorrelation, Guangzhou, Zhuhai, Foshan, Dongguan and Zhongshan were classified to the HH type and the number of cities with this classification was constant. The number of LL type cities remained unchanged in the first three periods but decreased in 2015. Shantou was consistently a LH type city and Huizhou changed gradually to a LH type city. Visualization shows that the east bank of the Pearl River estuary, with Guangzhou, Dongguan and Shenzhen as the core, is the best area for the urban and rural coordination development and the level of urban and rural coordination development in the east and west wings and the north of Guangdong is relatively low. The level in these three areas also shows the spatial pattern of "north > east > west."

Using PCA and ESDA to study the driving mechanism of urban and rural coordination development, it is concluded that location, economic development and urbanization level are the most important driving forces. These are followed by industrial structure, which played an important role in every period. The importance of health care, growth rate of GDP and employment as driving mechanisms gradually decreased.The importance of fixed asset investment and total retail sales of urban and rural consumer goods in 2000 and 2015 showed a positive correlation, while showing a negative correlation in 2005 and 2010. Education and GDP per capita showed the opposite-there was a positive correlation in 2005 and 2010 and a negative correlation in 2000and 2015.

Based on the study of dynamic mechanisms, in order to improve the coordination development level of urban and rural areas in Guangdong Province, this paper proposes the following two suggestions. First, nonwestern Guangdong should further optimize its industrial structure. High-level cities drive the

development of surrounding low-level cities. Advantages of the LH cities should be fully used. This means cities with good self-development and general surrounding development, such as Shantou and Huizhou, exert their influence on their surrounding areas and drive the development of western Guangdong. Cities in the Pearl River Delta should further optimize the industrial structure according to the conclusion of the dynamic mechanism. Second, western Guangdong and other regions should promote population urbanization in rural areas. At present, most of the rural poor in Guangdong Province live in areas with poor ecological environments. Local development has fallen into a vicious circle of development of "Fragile environment-Poverty-Plunder resources-Environmental degradation-Further poverty." A common situation in early years existed in which areas with fragile environments had a lower development level and lower urban and rural development levels, than those of most other provinces. The government cared more about the GDP growth rate and less about environment protection in these early years. However, this development was based on the use of resources, which caused further damage to the environment. Due to their low environmental recovery ability, these areas returned to poverty after a very short period of development. In such areas, effective policies should be formulated to guide pop- ulation transfer, promote the employment and settle- ment of rural population in urban areas, provide free employment training for peasant workers to enhance employment opportunities and optimize the rural industrial structure. This would change the traditional model in which development is solely driven by industry to one of agricultural industrialization. For example, most of the small and mediumsized enterprises in the Pearl River Delta are located in villages, towns or rural areas. Furthermore, most of these enterprises are engaged in foreign trade processing, which causes great damage to the environment. Guangdong's urban and rural coordination development is hoped to evolve from ahigh-speed mode to a high-quality mode. However, the pattern of "treatment after pollution" cannot meet the requirements of the high-quality mode. This transformation needs support at the policy level, since mar- ket participants may only care about maximizing their own interests rather than the maximization of social interests. Thus, the government should issue a series of preferential policies to encourage the acceleration of the transformation and upgrade, promote the development of service industry and reasonably adjust the proportion of primary, secondary and ter- tiary industries. Overall, this will prevent environ- mental damage from the source as an alternative to "treatment after pollution."

The main limitation of this study is that the methods proposed measure the URCD level at the city level rather than a higher regional level. Furthermore, issues such as the coordination of the development of Pearl River Delta (PRD) areas and nonPRD areas require further study. Additionally, the mode of "Fragile environment-Poverty-Plunder resources-Environmental degradation-Further poverty" would also be a topic of future interest.

Conflict of interest

The authors declare no conflict of interest.

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