Study of Urban and Rural Construction Land Change Based on Small Scale in Dafang

Xiaozhu CHEN *

School of Information, Guizhou University of Finance and Economics, Guiyang 550003

Abstract This paper is to examine the urban and rural construction land data of Dafang between basic year and final year based on country scale and spatial econometrics, and analyze its spatial pattern and change feature. According to the results, the construction lands in all the villages of Dafang County showed strong spatial autocorrelation and significant spatial cluster. After the analysis of local Moran's I, the construction lands in 381 villages of 36 counties presented strong activity. The original small-scale villages were gradually enlarging, which will not only gradually benefit local development, but also be in accordance with the strategy of "one city, one district, eight parks".

Key words Small scale, Urban and rural construction land, Spatial econometrics, Dynamic change, Dafang

Urbanization, which would affect the social progress of China in the 21st century[1], has always been a research focus in both China and foreign countries. Urbanization could broaden rural market, expand domestic demand, promote economic growth, and break the dual urban - rural structure, and it is the only way to realize rural modernization[2]. Land is a carrier of urbanization, and to scientifically plan the use of lands and rationally distribute the lands for urban and rural construction would directly influence the development of urbanization. However, the present studies in this field mainly concentrate on construction lands in urban cities[3-7], rather than in some small-scale villages. The studies of construction lands in some small-scale areas, however, are much closer to both the benefits of local residents and the actual situation of regional land use, especially in west China where the geographical and social conditions are complicated. Therefore, In this paper, based on the general planning of land use in Dafang County, the author compared the village - level construction land use at the base period of land use planning with that at the final phase, and analyzed its evolution features and trend, aiming to provide references for revising the land use plan in the future.

1 Source of data and research method

1.1 Source of data The study was based on the administrative map of Dafang County provided by Guizhou University, and the spatial data was collected according to the General Planning of Land Use in Dafang County. The plan started in 2009 and ended in 2020, covering 381 villages in Dafang County.

1.2 Introduction of the studied area Dafang County, located in Northwest Guizhou Province, Central Bijie area, east foothill of Wumeng Mountain and the north side of Liuchong River, spans the area from 105°15′ - 106°08′E and 26°50′ - 27°36′N. The county governs over 36 counties, including 18 ethnic minority villages. The GDP of Dafang county was 5.679 billion Yuan in 2009, an increase of 26.18% as compared with that in the last year. Of all the GDP, the primary industry contributed 1.296 billion Yuan, the secondary industry 2.11 billion Yuan, and the tertiary industry 2.282 billion Yuan. The national and local fiscal incomes were 716 800 and 484 900 Yuan. The per capita disposable income of urban residents in the whole county was 12 693 Yuan, and that of rural residents was 2 938 Yuan.

1.3 Research method Based on the hypothesis of spatial econometrics[8], the Moran's I index was adopted to analyze the construction land use at both the base period and final phase of land use planning, as well as to study its evolution features and trend.

1.3.1 Global Moran's I[9] Global Moran's I, proposed by Moran in 1948, reflects the similarity of the property value of neighboring regions. It was adopted to test the spatial autocorrelation of urban and rural construction land of 381 villages in Dafang county at both the base period and final phase. The formula is:

$$Moran's\ I = \frac{n\sum_{i=1}^{n}\sum_{j=1}^{n}W_{ij}(x_i-\bar{x})(x_j-\bar{x})}{\sum_{i=1}^{n}\sum_{j=1}^{n}W_{ij}(x_i-\bar{x})^2}$$

$\bar{x} = \frac{1}{n}\sum_{i=1}^{n}x_i$, x_i refers to the value of i, n is the number of regions, W means the spatial weights matrix, W_{ij} represents the degree of influence between i and j.

1.3.2 Local Moran's I[10]. The global evaluation of spatial correlation by the Moran's I would neglect the potential problems of insecurity, so it is necessary to conduct a local analysis. The construction data in each village was selected to calculate local Moran's I and draw a Moran's I spatial cluster diagram. The formula for local Moran's I is:

$$I_i = \frac{x_i-\bar{x}}{S^2}\sum_{j\neq 1}^{n}W_{ij}(x_j-\bar{x})$$

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* Corresponding author. E-mail: chwbwx@163.com

$S^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2$, $\bar{x} = \frac{1}{n}\sum_{i=1}^{n}x_i$ is similar to global Moran's I, x_i refers to the value of i, n is the number of regions, and W_{ij} represents the spatial weights matrix.

2 Result and analysis

2.1 Spatial change of urban and rural construction land use in Dafang County

2.1.1 Test of global Moran's I. According to the autocorrelation test of the construction land use in 381 villages at both the base period and final phase, the value of global Moran's I was improving with the time, and presented significant spatial cluster state, which would be beneficial to the development of local areas and promote the intensive use of land resources.

2.1.2 Test of local Moran's I According to the figures, during the base period of planning, the construction lands in Dafang County are very few, mainly because the local economy is still at the initial stage of its development. Compared with that in the final phase of planning, both the area and scale of construction land increase, especially in the ethnic minority regions in Northeast Dafang County. Under the guide of the general land use plan, the construction lands in all the 381 villages in Dafang County present strong activity, and are gradually increasing, which would benefit the urbanization development of local areas.

Table 1 Test of global Moran's I in Dafang County

Year	Moran's I index	*P* value	Standard deviation
Base period	0.1028***	0.002	0.0142
Final phase	0.3139***	0.001	0.0289

Note: a. rook first – order spatial weights matrix was adopted; b. In random test, 999 permutation was adopted; c. *** respresents signifances at the level below 1%.

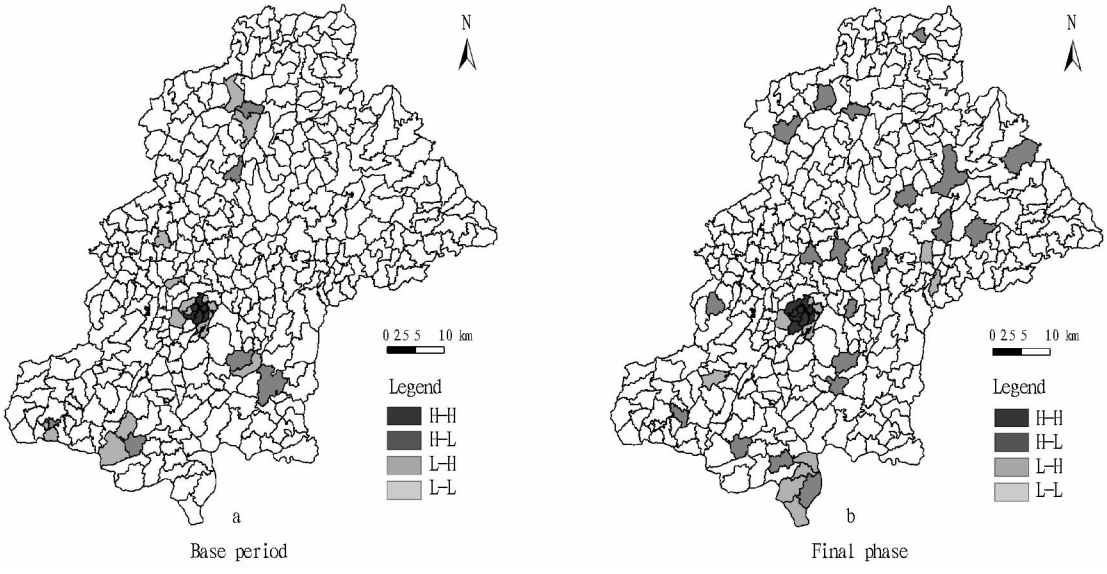

Fig. 1 Test of local Moran's I of urban and rural construction lands in 381 countries of Dafang

2.2 Causes to the spatial changes of the construction land use in Dafang County According to the development concept of the "Twelfth – Five Plan", Dafang County, with the support of the national and Guizhou Provincial policies, would actively promote its regional development by constructing an economic development zone in Dafang County, four industrial bands at four directions, and forming a vertical development framework of coal industry, tourism, service industry, food processing, construction, chemistry and medical industry. It is planned to enlarge the construction areas, realize their scale benefits, and improve the land use benefits of industrial economy and infrastructure in 30 counties by the end of 2020.

3 Conclusions

(1) According to the spatial autocorrelation test, the global Moran's I value at both the base period and final phase were positive, and negatively correlated with P value, presenting increasing significance of spatial autocorrelation. It indicates that the construction lands in Dafang County showed strong autocorrelation and significant spatial cluster state.

(2) After the analysis of local Moran's I, the construction lands in 381 villages of 36 counties presented strong cluster effect. Under the guidance of general land use plan and with the support of the national and provincial policies, the original small-scale villages were gradually enlarging, which will not only gradually benefit local development, but also be in accordance with the strategy of "one city, one district, eight parks".

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provide broad space for survival and development of characteristic large-scale farmland operation.

4.2 Consistent with agricultural structural adjustment and industrial distribution In less developed areas of China, especially hilly areas, blindly imitating operation mode of developed areas leads to convergence of industrial structure between regions. Neglect of comparative advantages and characteristic will lead to difficulty in product sales, low market competitive power, and increase of output without increase of income. Although hilly areas have diverse landform, different elevation has different climate conditions, this provides favorable condition for large-scale characteristic farmland operation in hilly areas and lays foundation for extending and enriching the long tail.

4.3 Having high efficient integrator to make vast consumers rapidly and conveniently find and enjoy various characteristic products At the same time of strengthening infrastructure construction in hilly areas, it is required to build a modern talent team and establish perfect, convenient and swift information platform and logistics system. Besides, it is recommended to change farmers' thoughts and ideas and undertake agricultural production and operation using Scientific Outlook on Development.

5 Conclusions

To realize urban and rural integration and accelerate integrated development of urban and rural economy, government should further increase investment in rural infrastructure, shorten physical distance between urban and rural areas, build rural information highway, gradually set up modern agricultural talent training system conforming to scientific development, and completely eliminate small peasant awareness. In a considerable long term, rural labor transfer should take road of combining external and internal aspects together, and promote sustainable development of agricultural modernization. In addition, it is recommended to establish and improve reform and construction of rural land market and household registration system.

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