Research on the Development of Urban-Rural Integration in Chengdu-Chongqing Economic Circle

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Abstract. In the process of China's economic and social transformation, the imbalance between urban and rural development is an important issue restricting the process of national modernization. Now the western region urgently needs the economic circle to drive the urban-rural integration development. In this paper, 42 cities in Chengdu-Chongqing economic circle are taken as the research objects[1]. The research show the following conclusions:(1) The overall degree of urban-rural integration in Chengdu-Chongqing economic circle has improved, and the level of urban-rural integration in Sichuan province is higher than that in Chongqing; (2) There are some regional differences in Sichuan province, and Chengdu has the best urban-rural integration development; (3) The integration degree of urban and rural areas is the highest in the nine districts of Chongqing, the second in the new district and the last in the other districts.

Keywords: Chengdu-Chongqing economic circle; urban-rural integration; entropy method; coupling and coordination degree

1 INTRODUCTION

The Chinese government is speeding up the construction of new-type urbanization, and the importance of urban-rural integration is becoming increasingly prominent. Focusing on the research of "Chengdu-Chongqing Economic Zone", we find that the Chengdu-Chongqing area is rich in natural and human resources. However, due to the unbalanced allocation of resources and unreasonable structure, the economic development of Chengdu-Chongqing area is still relatively backward. In 2022, the market opening index of the Chengdu-Chongqing economic circle was 108.22, an increase of 0.08 over the previous year, and the index growth rate was only about 0.1 percent, restricting economic exchanges among various regions.

In the past, there have been serious problems in the urban-rural dual structure, such as unbalanced development, unfair distribution of resources, and uncoordinated population flow between urban and rural areas[3]. Therefore, the task that integrating urban and rural development in the region has become more urgent. This paper selects the relevant index data of Chengdu-Chongqing region from 2020 to 2022 to analyze its

comprehensive development level. It also discusses the background of the coordinated development of urban and rural areas and present situation of the development of urban-rural integration. It hopes to make some contributions to the policy of expediting urban-rural integration in Chengdu-Chongqing area and other areas, as well as the development of China's new-type urbanization demonstration zone.

2   MODEL AND STUDY AREAS

2.1   Entropy Value Method

(1) Selection of samples:In this paper, m indicators and n samples are selected. Xij is the value of the jth index in the ith sample region, i=1,2,3,...n(n=42);j=1,2,3,...m (m=21).

(2) Data processing

For positive indicators:

$$X'_{ij} = \frac{X_{ij} - \mathrm{Min}(X_{ij})}{\mathrm{Max}(X_{ij}) - \mathrm{Min}(X_{ij})} \tag{1}$$

For negative indicators:

$$X'_{ij} = \frac{\mathrm{Max}(X_{ij}) - X_{ij}}{\mathrm{Max}(X_{ij}) - \mathrm{Min}(X_{ij})} \tag{2}$$

(3) The comprehensive score

1) The proportion of the ith sample under the jth index:

$$P_{ij} = \frac{X'_{ij}}{\sum_{i=1}^{n} X'_{ij}} \tag{3}$$

2)The value of K:

$$K = \frac{1}{\ln(n)} \tag{4}$$

3) The entropy value of the item j index:

$$e_j = -K * \sum_{i=1}^{n} (P_{ij} * \ln(P_{ij})) \tag{5}$$

4) Coefficient of variation of the item j index:

$$d_j = 1 - e_j \tag{6}$$

5) The weight of item j index:

$$w_j = \frac{d_j}{\sum_{j=1}^{m} d_j} \tag{7}$$

6) Comprehensive score:

$$U_i = \sum_{j=1}^{m} w_j x_{ij}' \tag{8}$$

2.2   Coupling Coordination Model

(1) The coupling degree:

$$C = \left(\frac{\prod_{i=1}^{n} U_i}{\left(\frac{1}{n} \sum_{i=1}^{n} U_i \right)^n} \right)^{\frac{1}{n}}, n=3. \tag{9}$$

(2) Coordination degree:

$$D = \sqrt{CT}, \quad T = \sum_{i=1}^{n} w_i U_i \tag{10}$$

Among them, Ui represents the comprehensive score of item i index, C is the coupling degree of urban and rural development in each region, and T is the comprehensive evaluation index.

2.3   Study Area and Data Sources

According to the Outline of the Construction Plan of Chengdu-Chongqing Twin Cities Economic Circle, the planning scope of Chengdu-Chongqing economic circle includes the central city of Chongqing and 27 districts and 15 cities of Sichuan province[1].This paper focuses on 42 cities and counties to assess the level of urban-rural integration development in Chengdu-Chongqing Economic Circle from the perspective of the new pattern in 2020-2022[4]. Most of the index data was obtained from the Sichuan Statistical Yearbook, Chongqing Statistical Yearbook, Chengdu Statistical Yearbook, social and economic development bulletins of various cities and counties, and China's Economic and Social Big Data Research Platform for the years 2020-2022.

3   CONSTRUCTION OF URBAN-RURAL INTEGRATION DEVELOPMENT INDEX SYSTEM

Based on the existing literature of scholars, this paper constructs an indicator system for the integrated development of urban and rural areas from the three dimensions of population, economy and society (as illustrated in Table 1).

Table 1. Index system of urban-rural integrated development

Dimension	Index	Indicator attributes	Indicator weight
Population	The urbanization rate of permanent residents in all regions	+	0.165
	The number of new urban employment workers	+	0.567
	Number of rural workers per 10,000 people[2]	+	0.267
Economy	Per capita disposable income of urban residents	+	0.215
	Per capita disposable income of rural residents[5]	+	0.023
	The difference in per capita disposable income between urban and rural residents	-	0.002
	Per capita living consumption expenditure of urban residents	+	0.023
	Per capita living consumption expenditure of rural residents	+	0.024
	Difference in per capita consumption expenditure between urban and rural residents	-	0.023
	Value-added of the primary industry	+	0.130
	Value-added value of the secondary industry	+	0.188
	Value-added value of the tertiary industry	+	0.237
	Fixed-asset investment grew over last year	+	0.004
	The proportion of regional financial expenditure in agriculture, forestry and water resources[6]	+	0.131
	Education spending	+	0.098
Society	Health expenditure	+	0.201
	Social health care and employment spending	+	0.118
	Entertainment service expenditure	+	0.247
	Rural electricity consumption	+	0.110
	Number of students in the middle school	+	0.105
	Number of students in the primary school	+	0.121

4   RESULTS

4.1   Measurement of the Level of Urban and Rural Integrated Development

After standardizing the value of the index, the weight of the index in each dimension is obtained by the entropy value method, and finally the product of the sum weight and the index value obtains the comprehensive score. According to the calculation results, the comprehensive score of each region of Chengdu-Chongqing economic circle under each index system is obtained, as shown in Table 2(due to the large amount of data, only the calculation results for 2022 in Chengdu are attached).

Table 2. .Regional scores of measures in each dimension in 2020-2022 in Chengdu

Area	2020			2021			2022		
	P	E	S	P	E	S	P	E	S
Chengdu	0.564	0.512	0.659	0.567	0.550	0.653	0.555	0.454	0.888
Zigong	0.133	0.103	0.067	0.138	0.114	0.073	0.132	0.118	0.078
Luzhou	0.182	0.144	0.152	0.181	0.156	0.153	0.181	0.170	0.154
Deyang	0.173	0.126	0.106	0.173	0.126	0.106	0.182	0.149	0.111
Mianyang	0.213	0.167	0.143	0.216	0.184	0.196	0.215	0.157	0.233
Suining	0.152	0.115	0.076	0.153	0.125	0.084	0.154	0.131	0.082
Neijiang	0.156	0.107	0.095	0.154	0.126	0.091	0.147	0.135	0.088
Leshan	0.152	0.137	0.074	0.162	0.152	0.191	0.159	0.159	0.307
Nanchong	0.245	0.176	0.181	0.249	0.176	0.171	0.241	0.198	0.142
Meishan	0.139	0.118	0.068	0.144	0.134	0.077	0.141	0.143	0.086
Yibin	0.211	0.180	0.168	0.221	0.196	0.132	0.217	0.207	0.159
Guangan	0.135	0.114	0.101	0.139	0.126	0.100	0.137	0.135	0.099
Dazhou	0.214	0.168	0.147	0.258	0.162	0.177	0.215	0.107	0.093
Ya'an	0.086	0.068	0.040	0.089	0.077	0.041	0.088	0.083	0.050
Ziyang	0.089	0.089	0.070	0.090	0.098	0.070	0.121	0.103	0.076

According to the analysis of Table 2, the coupling coordination degree in each region was concentrated between 0.2 and 0.5, indicating a low overall level of coordination. In 2022, except for Fengdu, the other regions' scores were higher than 0.2.The industrial integration development in Chengdu, Luzhou, Mianyang, Leshan, Nanchong, Yibin, and other regions of Sichuan Province continues to be at a relatively high level. And the urban-rural integration development capacity of Ya'an, Jiangbei, Nanan, Beibei, Banan, Fuling,b Qijiang, Dazu, Qianjiang, Changshou, Jiangjin, Yongchuan, Hechuan, Nanchuan, Tongliang, Tongnan, Rongchang, Liangping, Fengdu, Dianjiang, Zhongxian, and other districts and counties in Chongqing is relatively weak. In general, the comprehensive scores of all dimensions in Chengdu in 2020-2022 were ranked first. Within Chongqing, the urbanization rate of Yuzhong District had reached 100%, achieving the integration of urban and rural areas, so it did not listed in the table.

4.2 Comprehensive Score of Chengdu-Chongqing Economic Circle

The comprehensive scores of each region in a single dimension are added up to obtain the comprehensive scores of each year in each dimension and drawing the chart below. The chart reflects the changes in the trend of urban-rural integrated development level in each dimension from 2020 to 2022.
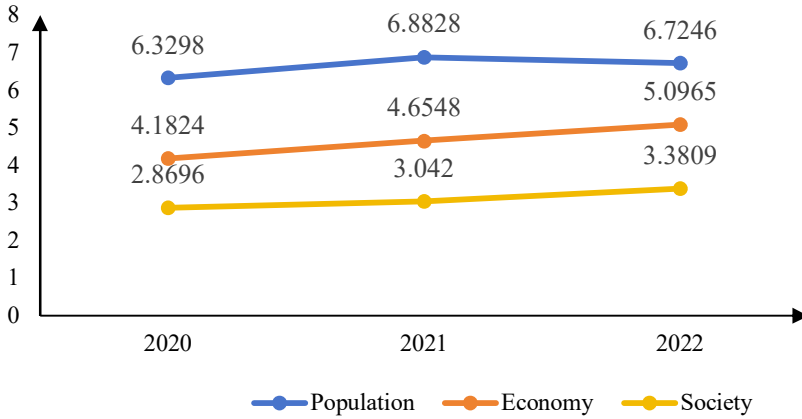
Fig. 1. The evolution trend of the comprehensive scores in the years of each dimension

According to the data,the population dimension accounts for nearly half, indicating that urbanization rate and population flow can better represent the situation of urban-rural integration.Therefore,we can consider promoting the high-quality development of urban-rural integration in the Chengdu-Chongqing region by focusing on population structure and flow.

4.3   Urban-Rural Integration and Coordination Degree

This paper calculates the urban-rural integration development index of each area by the coupling coordination model for the years 2020-2022(due to the large amount of data, only the calculation results for 2022 are attached, refer to Table 3 for details).

Table 3. Grade of urban-rural integration in 2022

Area	Grade	Area	Grade	Area	Grade	Area	Grade
Chengdu	VIII	Guangan	IV	Yubei	IV	Yongchuan	III
Zigong	IV	Dazhou	IV	Banan	III	Nanchuan	III
Luzhou	V	Ya'an	III	Wanzhou	IV	Bishan	IV
Deyang	IV	Ziyang	IV	Fuling	III	Tongliang	III
Mianyang	V	Dadukou	IV	Qijiang	III	Tongnan	III
Suining	IV	Jiangbei	III	Dazu	III	Rongchang	III
Neijiang	IV	Shapingba	IV	Qianjiang	III	Liangping	III
Leshan	V	Jiulongpo	IV	Changshou	III	FengDu	II
Nanchong	V	Nanan	III	Jiangjing	III	Dianjiang	III
Meishan	IV	Beibei	III	Hechuan	III	Zhongxian	III
Yibin	V						

In general, the grade is higher in Sichuan than that in Chongqing. As we can see, Chengdu had the highest level, which was grade 8.Except Ya'an, the other area in Sichuan achieved grade Ⅳ. But in Chongqing only a few districts achieved Ⅳ, and FengDu has the lowest level of urban-rural integration, it was grade Ⅱ which meant it has extremely poor fusion degree.

5 CONCLUSIONS

This paper used entropy method and coupling coordination model to determine the weight ratio of each selected index and the coupling coordination degree of urban-rural integration development[7], and drew the following conclusions:

Overall, in 2020-2022, Sichuan Province ranked the top in the comprehensive scores of the three dimensions, but it was still in the average level of integration, and Chongqing City changed from poor integration to average integration. It showed that the urban-rural integration in Sichuan Province has reached the bottleneck stage, and Chongqing is still in the development stage. From a local point of view, the comprehensive scores of various indicators in Chengdu was the best in Sichuan Province, the worst was Ya 'an, and the rest of the region was at the average level. The integration level of Chongqing was generally poor and there were obvious regional divisions, which were successively the main urban area, the new main urban area, and other districts.

ACKNOWLEDGMENT

REFERENCES

1. Yuan Ya, Wu Shanxun, He Wei. Study on spatiotemporal evolution characteristics and influencing factors of urban land use efficiency in Chengdu-Chongqing Economic Circle[J].Urban and Rural Planning,2023,(01):78-84.
2. Wang Linmei, Michael Jordan. Research on the measurement and optimization strategy of urban-rural integrated Development level in Chengdu-Chongqing Shuangcheng Economic Circle [J]. Western China, 2022, (04): 33-43.
3. Hao Ying. Research on the coupling and coordinated development of regional economy a nd ecological environment in Chengdu-Chongqing Economic Circle[D].Chongqing Techn ology and Business University,2022.DOI:10.27713/d.cnki.gcqgs.2022.000742.
4. Rao Meijiao. Research on the coupling and coordinated development and influencing fact ors of in-situ urbanization in Chengdu-Chongqing Economic Circle[D].Chongqing Jiaoton g University,2022.DOI:10.27671/d.cnki.gcjtc.2022.000525. Zhao Liqin, Li Lin, Wang Tia njiao. Economic Issues,2023,(02):120-128.DOI:10.16011/j.cnki.jjwt.2023.02.011.
5. Wang Yongxia. Research on the efficiency of financial support for agriculture in Chongqin g and its countermeasures[D].Chongqing University,2010.
6. Zhang Chengqiu. Study on the level measurement and influencing factors of urban-rural integrated development in Chengdu-Chongqing Shuangcheng economic circle [D]. Chongqing Technology and Business University, 2021.DOI:10.27713/d.cnki.gcqgs. 2021.000163.
7. Zhao Deqi, Chen Na. Study on the level measurement of urban and rural integrated development in China [J]. Exploration of Economic Issues, 2019, (12): 1-28.