

Analysis and Countermeasures of Regional Economic Differences in Sichuan Province Driven by Digital Economy

Hang Zuo¹, Guodong Miao², Xinyu Pang³

^{1,2,3}School of Mathematics, Chengdu Normal University, Chengdu, Sichuan, China

¹zuohang2021@163.com, ²1184409328@qq.com, ³3056547923@qq.com

Abstract: ***Objective:** This paper takes the urban agglomerations in Sichuan Province region as the research object, aiming to explore the status of spatial economic linkages in the urban agglomerations in Sichuan Province region and promote its regional coordinated development. **Methods:** The inductive summary method, theoretical analysis method, qualitative analysis method and quantitative calculation method are used. Through extensive literature review and data collection, relevant theories are sorted out, and the improved gravity model is adopted for measurement. **Conclusions:** 1) There are shortcomings in the spatial economic linkages of the urban agglomerations in Sichuan Province region, including backward urban economic development levels, unbalanced urban scale structure systems, insufficient urban industrial division and cooperation, lagging construction of transportation connection channels, and insufficient administrative system coordination and support. 2) Targeted suggestions are put forward, including optimizing the urban industrial layout, and promoting regional industrial division, inter - regional coordination and industrial cooperation in the marginal areas of Sichuan Province. 3) Strengthening the construction of transportation facilities, building a comprehensive 1-hour transportation circle and improving transportation hubs. 4) Improving the overall coordination mechanism, establishing an integrated market and exploring the urban cooperation benefit balance mechanism to strengthen the economic linkages of the urban agglomeration.*

Keywords: Urban agglomerations in Sichuan Province region, Optimization strategies, Spatial economic linkages.

1. Introduction

Enhancing the internal economic linkages of urban agglomerations is an effective way to promote the coordinated and efficient development of regions in China. The construction of the urban agglomerations in Sichuan Province region is of great significance for narrowing the economic gap between the eastern and western regions of China, building a moderately prosperous society in all respects and stabilizing national economic growth. Converse [1] proposed the break point model, pointing out that the economic hinterland range of a city is related to the size and distance of the city and its adjacent cities, and it is often used to determine the economic influence range of a city. Taaffe [2] took American cities as the research object, analyzed the air transportation linkages among them, and found that the central city plays a dominant role in the air transportation linkages among cities. He also proposed that the intensity of economic linkages is directly proportional to the product of the population between cities and inversely proportional to the square of the distance. Garrison [3] studied the inter-regional population migration and industrial flow through location entropy. Francisco [4] studied the spatial accessibility of urban agglomerations and believed that accessibility has an important impact on the economic exchanges of urban agglomerations. Bunnell [5] et al. analyzed the spatial expansion process of the Kuala Lumpur metropolitan area in the process of globalization from the perspectives of technology flow, information flow and transportation flow. Yang Lihua and Sun Guiping [6] constructed an evaluation index system for the construction level of transportation networks and quantitatively analyzed the transportation network linkages among cities by using the transportation connection degree model. Meng Deyou and Lu Yuqi [7] modified the gravity model with time distance, calculated the intensity and direction of economic linkages in various regions of Jiangsu Province, and analyzed the

regional differentiation characteristics. Lao Xin et al. [8] measured the economic linkages among cities in the middle reaches of the Yangtze River urban agglomeration, analyzed the nodal centrality of each city in the economic network, the influence range of the central city and divided the sub-regions of the urban agglomeration. Xu Jianbin et al. [9] analyzed the economic linkages and spatial flows of the Chang-Zhu-Tan urban agglomeration and explored the optimization path of the spatial heterogeneity of the Chang-Zhu-Tan urban agglomeration. Chen Qunyuan and Song Yuxiang [10] found that the comprehensive strength of cities and the degree of industrial extroversion are important factors affecting the spatial economic linkages of urban agglomerations, and the influence of the secondary industry on urban economic linkages is stronger than that of the tertiary industry. Sheng Kerong et al. [11] studied the influence mechanism of regional population size, economic development stage, foreign economic linkages, regional political factors and infrastructure conditions on the urban size distribution. Liu Huake [12] found that factors such as population size, economic development level, government regulation and transportation conditions have a significant impact on regional economic linkages. Yuan Angui [13] discussed the formation mechanism of the economic space of the Chengdu-Chongqing urban agglomeration from multiple aspects such as industrial agglomeration and diffusion, and proposed the H-shaped spatial layout characteristics of the economic space of the Chengdu-Chongqing urban agglomeration. Cao Weiwei et al. [14] studied the intensity and density of the economic linkage network of the Chengdu-Chongqing urban agglomeration based on the gravity model and social network analysis method, divided the cohesive subgroups, and pointed out that the Chengdu-Chongqing urban agglomeration has formed an economic linkage network, with close linkages within each subgroup but relatively low correlations between subgroups.

Yao Zuolin and Tu Jianjun et al. [15] reorganized and divided the county-level administrative regions as the basic components to form new urban units, and characterized the spatial structure elements of the Chengdu-Chongqing urban agglomeration, believing that the Chengdu-Chongqing region is in a critical stage of transition from an administrative economy to a regional economy. Xiao Jincheng et al. [16] redefined the scope of the Chengdu-Chongqing urban agglomeration at the current development stage through various methods.

2. Basic Concepts and Related Theories

An urban agglomeration consists of numerous cities within a certain regional range. The cities have convenient transportation, complementary economic functions and close social linkages, and it is a densely populated urban area.

Economic linkages are the most common and important linkages in spatial linkages and are also closely interdependent with other spatial linkages. This paper focuses on the economic linkages among cities within the urban agglomeration in the study of urban spatial linkages. Moreover, spatial economic linkages mainly arise from the economic activities of micro-subjects.

The agglomeration effect refers to the trend of economic activity subjects and factors such as labor, capital and technology to be concentrated in a region under the influence of differences in regional economic returns.

The diffusion effect refers to the trend of economic activity subjects and factors such as labor, capital and technology to be dispersed in a region in order to avoid the agglomeration diseconomies caused by excessive agglomeration.

Economic activity subjects tend to choose to be located in areas close to cities. The average distance of the spontaneous flow of various factors within the urban agglomeration is limited by the spatial distance, and the flow of factors is the means to realize the economic linkages among cities. Therefore, the spatial position relationship between regions will ultimately have an important impact on their economic linkages, which is the spatial proximity effect. The spatial proximity effect will affect the economic layout, spatial structure and even the economic development direction of a single city of the urban agglomeration.

The mechanism of spatial economic linkages of urban agglomerations mainly includes generation mechanism, driving mechanism and constraint mechanism. The generation mechanism means that not any region can eventually develop into an urban agglomeration. Generally, there are three prerequisites: complementary functions among cities, good transportation accessibility among cities and few interference opportunities among cities. The driving mechanism is divided into two types: market-driven and government-driven. Market-driven means that micro-economic activity subjects such as enterprises and labor pursue the maximization of their own interests; some non-market behaviors such as investment promotion, economic cooperation of city governments and cross-regional infrastructure construction are government-led economic activities.

The central place theory assumes that the population and resources are evenly distributed, people are rational economic men, the demand is evenly distributed in space and the market is perfectly competitive. Regions form different types of central places under the influence of market, transportation and administrative factors.

The growth pole theory holds that economic growth does not occur evenly across the entire region. Industries with economic vitality will grow first, and these industries often gather in the same location. Eventually, this location forms a growth pole of the entire region. During the rapid development of the growth pole, it dominates the growth of surrounding areas and other sectors through agglomeration and diffusion effects and multiplier effects.

3. Study Subjects and Research Methods

3.1 Study Subjects

The urban agglomerations in Sichuan Province region is located within the Sichuan Basin. The "Chengdu-Chongqing Urban Agglomeration Development Plan" defines its geographical scope, specifically including 15 cities in Sichuan such as Chengdu, Zigong, Luzhou, Deyang, Mianyang (excluding Beichuan County and Pingwu County), Suining, Neijiang, Leshan, Nanchong, Meishan, Yibin, Guang'an, Dazhou (excluding Wanyuan City), Ya'an (excluding Tianquan County and Baoxing County) and Ziyang. The main research contents of this paper are as follows:

First, on the basis of extensive literature review and data collection, review and sort out the relevant domestic and foreign research on regional economic linkages. Summarizing the existing research results is conducive to the in-depth study of the spatial economic linkages of the urban agglomerations in Sichuan Province region.

Second, taking the urban agglomerations in Sichuan Province region as the research object, use the improved gravity model to measure the economic linkages among cities in the urban agglomerations in Sichuan Province region, and determine the main economic linkage directions and the economic radiation capabilities of regional central cities such as Chengdu.

Third, according to the measurement results of the spatial economic linkages of the urban agglomerations in Sichuan Province region, explore the constraints and realization paths of its urban economic linkages, and put forward some development countermeasures and suggestions for the unbalanced development of the urban agglomerations in Sichuan Province region.

3.2 Study Methods

3.2.1 Inductive summary method

Use platforms such as China National Knowledge Infrastructure (CNKI) and Wanfang Data to collect a large amount of data and review relevant literature, and make targeted summaries to understand relevant theories such as the economic basis theory of urban agglomerations, the theory of spatial interaction and the spatial economic linkages among

cities, as well as the research on topics related to the Sichuan Province region, providing strong theoretical support and basis for studying the economic development overview of the Chengdu-Chongqing urban agglomeration.

3.2.2 Theoretical analysis method

Sort out the relevant theories of urban spatial economic linkages in regional economics and analyze the action mechanisms to provide theoretical support for measuring the intensity and direction of economic linkages of urban agglomerations.

3.2.3 Qualitative analysis method

Analyze the main contents and research perspectives of urban economic linkages, summarize the development status of cities in the urban agglomerations in Sichuan Province region and the stage characteristics of economic linkages among cities, and put forward the strengthening countermeasures for the spatial economic linkages of the urban agglomerations in Sichuan Province region.

3.2.4 Quantitative calculation method

Measure the intensity and direction of the spatial economic linkages of the Chengdu-Chongqing urban agglomeration through the improved gravity model and economic

membership index, and analyze the constraints of its spatial linkages based on this.

4. Results and Analysis

This paper will mainly conduct a qualitative analysis of the prominent problems of economic linkages, sort out the main deficiencies affecting the economic linkages of the urban agglomerations in Sichuan Province region, and put forward corresponding countermeasures and suggestions accordingly.

4.1 Analysis of the Shortcomings of the Spatial Economic Linkages of the Urban Agglomerations in Sichuan Province Region

4.1.1 Backward urban economic development level

The economic development level of a city affects the economic linkages among cities through the agglomeration and diffusion effects. The economic development level of a city can be divided into two aspects: economic scale and development quality. This paper selects several representative indicators in terms of urban economic scale and development quality to compare the urban agglomerations in Sichuan Province region with the more mature Yangtze River Delta urban agglomeration and Pearl River Delta urban agglomeration in China, as shown in Table 1.

Table 1: Comparison of the development levels of the three urban agglomerations

Comparison indicators		Sichuan Province (15 cities)	Yangtze River Delta (26 cities)	Pearl River Delta (9 cities)
Economic scale	Urban permanent population	42.17 million	107.35 million	54.26 million
	Regional GDP	3.7 trillion yuan	16.5 trillion yuan	7.6 trillion yuan
	Per capita GDP	20,000 - 50,000 yuan	80,000 - 140,000 yuan	80,000 - 160,000 yuan
Development quality	Per capita disposable income	About 20,000 yuan	40,000 - 60,000 yuan	40,000 - 60,000 yuan
	Loan-to-deposit ratio of financial institutions	40%—60%	70%—90%	60%—80%
	Urbanization rate	40%—70%	60%—80%	70%—90%

The urban permanent population of the urban agglomerations in Sichuan Province region is relatively small, the regional GDP is relatively low, the per capita GDP and per capita disposable income are much lower than those of the Yangtze River Delta and Pearl River Delta, the financial support is relatively weak, and the urbanization rate is relatively low. In terms of both economic scale and development quality, the urban agglomerations in Sichuan Province region is comprehensively behind the Yangtze River Delta and Pearl River Delta. In addition, the economic development level of a city also includes aspects such as public service capabilities, resource and environmental carrying capacity and sustainable development, which are basically based on other economic development foundations. The economic development of the urban agglomerations in Sichuan Province region is relatively backward, and these aspects are also difficult to compare with those in the southeastern coastal areas. It can be seen that the economic conditions of cities in the urban agglomerations in Sichuan Province region generally have the characteristics of “scattered and small”, the development of the urban agglomeration is not yet mature, and the backward urban economic development level is the fundamental reason for the relatively loose economic linkages of the urban agglomerations in Sichuan Province region.

4.1.2 Unbalanced urban scale structure system

According to the distance decay principle, the radiation intensity of the core city of an urban agglomeration to cities at different distances is not equal, and it is difficult for peripheral cities to have a strong spatial correlation with the core city to promote economic development. Therefore, in a relatively mature urban agglomeration, in addition to one or two core cities radiating the entire urban agglomeration, several regional central cities are also needed to supplement the radiation function of the core city and drive the development of peripheral cities. If an urban agglomeration lacks regional central cities to undertake the radiation function of the core city, it will be difficult for peripheral cities to integrate into the economic integration development process of the urban agglomeration, and the strategic significance of developing the urban agglomeration will be greatly reduced. Therefore, improving the urban scale structure system plays an important role in strengthening the spatial economic linkages of the urban agglomeration.

Based on the relevant economic theories introduced in this paper, the “urban quality” score of Chengdu reaches 958, and the scores of other cities are all below 200, and there is still a phenomenon of urban scale structure break. Therefore, the

insufficient development of regional central cities limits the full play of the agglomeration and diffusion effects of the urban agglomeration and the spatial economic exchanges, further leading to the loose spatial linkages of the urban agglomerations in Sichuan Province region.

4.1.3 Insufficient urban industrial division and cooperation

Industrial layout is the reconfiguration of industries on the basis of the existing industrial spatial distribution. The urban agglomerations in Sichuan Province region is still in the initial development stage, and there are some problems of insufficient division and cooperation in industrial layout to some extent.

The industrial division of some cities in the urban agglomerations in Sichuan Province region is not clear. The industrial base of the urban agglomerations in Sichuan Province region comes from the Third Front Construction period, and the layout is relatively scattered, forming industrial cities such as Deyang and Mianyang. After the reform and opening up, various cities have competed for development. Due to the similarities in natural conditions, geographical locations and development foundations of some cities in the urban agglomerations in Sichuan Province region, the industrial convergence phenomenon has been further aggravated under the action of path dependence.

The industrial cooperation of some cities in the Chengdu-Chongqing urban agglomeration is insufficient. The advantageous industrial resources across cities in the urban agglomerations in Sichuan Province region have not been integrated, and there is a lack of large industrial clusters, which is not conducive to the economic exchanges among cities.

The independent industrial layout of cities is the deep-seated reason for the weak economic linkages of the urban agglomerations in Sichuan Province region. Therefore, it is necessary to make clear plans for industrial development within the scope of cross-provincial administrative regions and establish an inter-city industrial cooperation mechanism for overall development.

4.1.4 Lagging construction of transportation connection channels

The economic exchanges among cities need to be realized through transportation connection channels such as highways, railways, airports, pipelines, waterways and information networks. For the urban agglomerations in Sichuan Province region which is mainly composed of hills and mountains, the transportation connection channels are extremely important. The transportation connection channels of the urban agglomerations in Sichuan Province region mainly rely on expressways.

The backward construction of transportation connection channels has led to higher factor flow costs in the urban agglomerations in Sichuan Province region than in the southeastern coastal areas. In terms of highway transportation, the expressway network in the urban agglomerations in Sichuan Province region is not yet perfect. There are few

alternative routes between cities, many detours, low designed speeds, and high transportation time and monetary costs. In terms of railway transportation, due to various reasons, the railway planning in the urban agglomerations in Sichuan Province region started relatively late, and the overall construction is relatively backward. Some cities are not yet connected by railways, and the construction of intercity high-speed railways lags behind some western regions. There is no fast and convenient connection channel between cities.

Therefore, the intercity transportation network of the urban agglomerations in Sichuan Province region is not yet perfect, which hinders the cross-regional flow of factors and is not conducive to the division of labor and cooperation among cities. This not only restricts intercity economic exchanges but also constitutes a major obstacle to the economic development of the urban agglomerations in Sichuan Province region.

4.1.5 Insufficient coordination and support of the administrative system

Under the current socialist market economic system in China, the government has a decisive influence on economic development. An urban agglomeration is a collection of urban economic interests, not a unified urban administrative organization. Various development policies formulated by local governments to maximize local interests have led to the objective result of competition among cities and have affected urban spatial economic linkages in many aspects.

The development of an urban agglomeration cannot be separated from the intervention of administrative forces. If there is a lack of unified coordination among local governments and each pursues the maximization of its own interests without considering the overall interests, the intensity of competition will be intensified, which is not conducive to the cultivation and development of the urban agglomeration. The exchanges and interactions between cities at the Sichuan Province lack administrative support. The urban agglomerations in Sichuan Province region as a whole also lacks unified coordination in development strategies, economic planning and other policies, and even affects industrial layout and infrastructure construction, which is not conducive to economic exchanges.

If a unified coordination mechanism with binding force can be formed among city governments and the development of the urban agglomeration can be promoted by administrative forces, it will help to solve problems such as the discontinuity of the urban scale structure, homogeneous industrial development, lack of infrastructure and waste of resources, and improve the efficiency of resource allocation.

4.2 Strategic Choices for Strengthening the Spatial Economic Linkages of the Urban Agglomerations in Sichuan Province Region

4.2.1 Optimizing the urban industrial layout

The difference in industrial systems is the basis for urban cooperation. The key to strengthening intercity economic exchanges lies in the development of differentiated industrial

systems by each city based on its comparative advantages, forming a situation of reasonable division of labor and complementary industries among cities. The optimization of the industrial layout of the urban agglomerations in Sichuan Province region can be promoted from three levels: first, the industrial division within each region; second, the coordinated development of industries between regions; and third, strengthening the industrial cooperation in the adjacent areas of Sichuan and Chongqing.

The Sichuan Province can jointly set up the “Urban Agglomerations in Sichuan Province Region Development Fund” to provide financial and policy support for large industrial projects that meet the requirements of optimizing the industrial layout, so as to mobilize the enthusiasm of city governments.

4.2.2 Strengthening the construction of transportation facilities

The urban agglomerations in Sichuan Province region has an urban density far exceeding the national average level, and the restricting factor for its overall loose economic linkages is the inconvenience of intercity transportation under special terrain conditions. This paper analyzes and finds that the factor flow in the urban agglomerations in Sichuan Province region extremely depends on expressways, while the construction of intercity high-speed railways and intercity rail transit is extremely backward. Therefore, the strengthening of transportation facilities construction should start from the perspective of “making up for shortcomings” and can be promoted in the following three aspects: first, improving the expressway construction to accelerate the agglomeration of population and factors; second, accelerating the construction of intercity high-speed railways and intercity rail transit to build a comprehensive 1-hour transportation circle; and third, strengthening the construction of transportation hubs to improve the comprehensive transportation efficiency.

4.2.3 Improving the overall coordination mechanism

Without the coordination and unified actions of city governments, the implementation of a series of countermeasures to strengthen the spatial economic linkages of the urban agglomeration will be impossible, and the optimal allocation of resource factors in the entire urban agglomeration will also be difficult to achieve. Therefore, improving the overall coordination mechanism of city governments is a necessary means to strengthen urban economic exchanges. The establishment and improvement of the overall coordination mechanism should be promoted in a problem-oriented manner and can be considered from the following three aspects:

First, in response to the problems of city governments acting independently and issuing policies from multiple sources, establish and improve the administrative coordination mechanism of city governments.

Second, in response to the problem of distorted market environments in various regions, establish unified market standards for urban agglomerations, highlight the decisive role of the market in resource allocation, and promote the free

flow of factors.

Third, in response to problems such as repeated construction, vicious competition and inefficient development, explore the urban cooperation benefit balance mechanism to achieve mutual assistance and win-win results among cities.

4.3 Paths to Strengthening the Spatial Economic Linkages of Each Area

This paper analyzes and finds that it is difficult to rapidly strengthen the economic linkages of the urban agglomerations in Sichuan Province region solely by the market-driven mechanism based on the existing economic development foundation. Efforts should be made to improve from the perspective of the government-driven mechanism. The development differences among various areas of the urban agglomerations in Sichuan Province region are significant, and the main factors for the loose economic linkages among various areas of the urban agglomerations in Sichuan Province region are also different. Therefore, different treatments and classified policies should be adopted.

For the core hinterland of Chengdu, it can be divided into two types of areas. First, for Deyang, Meishan and Ziyang, priority can be given to reducing factor flow costs and promoting integrated development in intercity rail transit and government overall coordination. Secondly, by cultivating or introducing relatively complete industrial chains, a virtuous cycle of industrial division and cooperation among regions can be formed. Second, for areas such as Leshan, Mianyang and Ya'an that are relatively far from Chengdu, priority can be given to expanding the city scale, improving the city quality, strengthening characteristic industries, forming node cities with north-south traffic, and then connecting with Chengdu through the construction of intercity high-speed railways to shorten the factor flow time and cost, so as to strengthen economic linkages and give play to the leading role of Chengdu.

The competitive hinterland of the Sichuan Province is the key to the real formation of the urban agglomerations in Sichuan Province region. First, secondary cities of the urban agglomeration should be cultivated, and priority should be given to expanding the city scale, improving the city quality, and attracting regional population and resource factors to gather. On the one hand, the administrative system barrier should be broken through, and an overall coordination mechanism should be established with Chongqing. Through government guidance of enterprise investment cooperation, the radiation and driving role of Chongqing can break through the administrative region limit and extend to the adjacent areas of Sichuan and Chongqing, promoting the integrated development of border areas with relatively close city distances. On the other hand, the city distance can be shortened and the factor flow cost can be reduced through the implementation of the Chengdu Eastward Expansion Strategy and the construction of intercity high-speed railways, so as to strengthen the economic linkages with Chengdu.

The marginal hinterland of the Sichuan Province is relatively far from the core cities, and the transportation connection cost is too high. At present, it is still in an independent

development stage and it is difficult to receive the radiation of the core cities in the short term. On the one hand, the city quality of Dazhou should be improved, regional population and resource factors should be gathered, the “capillary” construction of expressways should be improved, the transportation connection channels in the adjacent areas of Sichuan should be opened up, the factor flow cost should be reduced, and an overall coordination mechanism in the adjacent areas of Sichuan and Chongqing should be established to form an integrated development urban dense area. On the other hand, full use should be made of the special location of the marginal hinterland at the east-north exit of the Sichuan Basin. By constructing high-speed railways to connect with Wuhan and Zhengzhou externally and with Chengdu and Chongqing internally, the entire urban agglomerations in Sichuan Province region can be connected to the national factor flow network, and Dazhou can be built into the gateway cities in the northeast direction of the urban agglomerations in Sichuan Province region, so as to expand the radiation range of the Sichuan Province region and drive the development of surrounding areas.

5. Conclusion

The main shortcomings of the spatial economic linkages of the urban agglomerations in Sichuan Province region include five aspects: urban economic development level, urban scale structure system, urban industrial layout, transportation connection channels, and government administrative system.

The economic situation of the urban agglomerations in Sichuan Province region has the characteristics of “scattered and small”. Except for the core cities, the economic scale of each city is relatively small and the development quality is not high, which is the fundamental reason for the relatively loose economic linkages.

The urban economic scale structure in the urban agglomerations in Sichuan Province region is seriously unbalanced, and the development of regional central cities is insufficient, which limits the full play of the agglomeration and diffusion effects of the urban agglomeration and the spatial economic exchanges.

There are phenomena of insufficient industrial division and cooperation and similar development paths in the urban agglomerations in Sichuan Province region. The competition within the urban agglomeration is greater than the cooperation, which is not conducive to the free flow of factors. The independent industrial layout of cities weakens the economic linkages among cities.

The intercity transportation network of the urban agglomerations in Sichuan Province region is not yet perfect. The construction of the 1-hour transportation circle between the core cities and the surrounding cities has not been truly formed. The poor connection of intercity transportation has greatly increased the transportation time, raised the monetary cost, hindered the cross-regional flow of factors, and is not conducive to the division of labor and cooperation among cities. This not only restricts intercity economic exchanges but also constitutes a major obstacle to the economic development of the urban agglomerations in Sichuan Province

region.

In the urban agglomerations in Sichuan Province region, the communication and interaction among the cities at the periphery lack the support of administrative power. The urban agglomerations as a whole also lack unified coordination in policies such as development strategies and economic plans. This even affects the industrial layout and infrastructure construction, which is not conducive to economic exchanges.

This paper puts forward three targeted suggestions to make up for the shortcomings: first, optimize the urban industrial layout, promote the industrial division within the region, the coordinated development between regions, and strengthen the industrial cooperation in the adjacent areas of Sichuan and Chongqing; second, strengthen the construction of intercity transportation facilities, build a comprehensive 1-hour transportation circle, improve the construction of transportation hubs, and reduce the factor flow cost; third, improve the overall coordination mechanism, establish an integrated urban market, explore the urban cooperation benefit balance mechanism, and promote the economic linkages among cities.

Fund Project:

This paper is a scientific research topic of digital economy of Sichuan Higher Education Association in 2024, “The level of regional economic development in Sichuan Province under the trend of digital economy.

Grey cluster correlation Analysis (Project number: SZJJ2024YB-016) is one of the phased results; This research is supported by the project of Sichuan Provincial College Students’ Innovation and Entrepreneurship Training Plan in 2024, “Red” Safe World, “Agriculture” safe Country -- Application Research on the Development of Rural Revitalization E-commerce Platform based on Grey Prediction Model “(Project No.: 202414389012).

References

- [1] Chen Lian, CAI Xiaofeng. Study on the theory of urban hinterland and the method of hinterland division [J]. *Economic Geography*, 2005, 25(5): 629-631.
- [2] Taaffe, Edward J. The urban hierarchy: An air passenger definition [J]. *Economic Geography*, 1962, 49(2): 1-111.
- [3] Garrison C B, Paulson A S. An entropy measure of the geographic concentration of economic activity [J]. *Economic Geography*, 1973, 19(6): 32-51.
- [4] Francisco J. Martinez C. Access: the transport-land use economic link [J]. *Transport Research*, 1995, 29(6): 457-470.
- [5] T. Bunnell, P. A. Barter, S. Morshidi. Kuala Lumpur metropolitan area: a globalizing cityregion [J]. *Cities*, 2002, 19(5): 357-370.
- [6] Yang Lihua, Sun Guiping. Comprehensive Analysis of the Transportation Network in the Beijing - Tianjin - Hebei Urban Agglomeration [J]. *Geography and Geo-Information Science*, 2014, 30(02): 77 - 81.
- [7] Meng Deyou, Lu Yuqi. The Intensity and Direction of Regional Economic Linkages in Jiangsu Province Based on the Gravity Model [J]. *Progress in Geography*, 2009, 28(05): 697 - 704.

- [8] Lao Xin, Shen Tiyan, Yang Yang, Zhang Yuan. Research on the Measurement of Economic Linkages in the Urban Agglomeration in the Middle Reaches of the Yangtze River: A Social Network Analysis Based on the Gravity Model [J]. Urban Development Studies, 2016, 23(07): 91 - 98.
- [9] Xu Jianbin, Zhan Qiang, Liu Chunhao, Wei Xiao, Song Jie, Sun Fenghua. Analysis of the Spatial Heterogeneity of the Changsha-Zhuzhou-Xiangtan Urban Agglomeration Based on Economic Linkages and Spatial Flows [J]. Economic Geography, 2015, 35(10): 36 - 43.
- [10] Chen Qunyan, Song Yuxiang. Analysis of the Spatial Linkages of the Urban Agglomeration around Changsha-Zhuzhou-Xiangtan from the Perspective of Urban Flow [J]. Economic Geography, 2011, 31(11): 1840 - 1844.
- [11] Sheng Kerong, Jin Yaokun, Ji Li. Influencing Factors of Urban Size Distribution: An Empirical Study Based on Cross - Country Cross - Section Data [J]. Economic Geography, 2013, 33(01): 66 - 71 + 65.
- [12] Liu Huake. The Pattern, Influencing Factors and Strategies of Urban Economic Linkages in Henan Province [J]. Journal of Henan Institute of Science and Technology, 2017, 37(11): 62 - 67.
- [13] Yuan Angui. Research on the Economic Spatial Development of the Chengdu - Chongqing Urban Agglomeration [D]. Southwest University of Finance and Economics, 2008.
- [14] Cao Weiwei, Yang Fei, Guan Yuxian, Pang Zhenjing. The Economic Linkage Network Structure of the Urban Agglomeration in the Chengdu - Chongqing Economic Circle [J]. Technology Economics, 2016, 35(07): 52 - 57 + 128.
- [15] Yao Zuolin, Tu Jianjun, Niu Huimin, Ha Lin, Li Jianbo. Analysis of the Characteristics of Spatial Structure Elements of the Urban Agglomeration in the Chengdu - Chongqing Economic Zone [J]. Economic Geography, 2017, 37(01): 82 - 89.
- [16] Xiao Jincheng, Wang Yanghong, Zhang Yan. Research on the Spatial Layout and Industrial Development of the Chengdu - Chongqing Urban Agglomeration [J]. Globalization, 2019(08): 30 - 48 + 134.