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Original Paper

Impact of Chengdu-Deyang-Meishan-Ziyang Transportation Integration on the Coordinated Development of Regional Economy

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Abstract

This paper aims to explore the impact of Chengdu-Deyang-Meishan-Ziyang transportation integration on the coordinated development of the regional economy, and reflect the value of further development of transportation integration in urban agglomerations in the future. Regional economic integration development is a general trend in the development of urban agglomerations, and the effectiveness of transportation integration is an important part of promoting regional economic integration. However, the connection between transportation integration and regional economic integration is still relatively vague. Therefore, this paper collects and analyzes relevant data and compares the development results of urban agglomerations before and after the implementation of the special plan to obtain the current progress and main results of transportation integration in the four cities of Chengdu, Deyang, Meishan and Ziyang, and then discusses its impact on urban agglomerations based on quantitative and qualitative aspects. The positive impact of regional economic integration development.

Keywords

Integrated transportation, regional economies, Positive impact

1. Introduction

1.1 Research Background

Under the wave of globalization, informatization and intelligence, regional economic integration has become a trend in the development of urban agglomerations. As the vanguard of regional economic

development, transportation's development level directly affects the efficiency of resource allocation within the region, the process of market integration and regional competitiveness. However, under the traditional traffic management model, the phenomenon of data islands is serious, and the problems of opacity and asymmetry of information are prominent, which seriously restrict the overall efficiency of the transportation system and regional coordination capabilities. Therefore, on the basis of traffic data sharing, promoting the process of transportation integration and achieving optimal allocation and efficient utilization of transportation resources has become an important way to promote the coordinated development of regional economies.

Chengdu, Deyang, Meishan and Ziyang are four important cities in Sichuan Province. They are geographically adjacent and have close economic connections. They have a good foundation for building a coordinated regional economic development body. With the continuous improvement of transportation infrastructure in recent years, especially the rapid construction of modern transportation networks such as high-speed railways, intercity railways, and highways, the transportation accessibility between Chengdu-Deyang-Meishan-Ziyang has been significantly improved, providing regional economic integration and development provides strong support. Therefore, how to further play the leading role of transportation integration, promote the free flow and optimal allocation of economic factors among the four cities, and achieve a higher level of coordinated regional economic development has become an urgent issue to be solved at present.

1.2 Research Significance

This study will help sort out the current transportation integration results of Chengdu, Deyang, Meishan and Ziyang, explore the mechanism of transportation infrastructure on the coordinated development of the regional economy, and enhance confidence in the sustainable development of existing transportation projects. It also provides scientific basis for the planning and construction of transportation infrastructure in this urban agglomeration and similar areas, and provides new perspectives and ideas for research in related fields. It is of great significance for realizing the regional coordinated development strategy and new urbanization strategy proposed at the national level, and has important reference value for promoting the coordinated development of the Chengdu-Deyang-Meishan-Ziyang regional economy and even the coordinated development of the national regional economy.

2. Literature Review

The first priority of economic development is transportation. Looking at the development process of representative urban agglomerations in various countries, the integrated development of transportation and the development of regional economic circles are interdependent, complementary, and jointly promoted.

2.1 Project Effectiveness in Developing Countries

Jiang Ce from the School of Economics of Liaoning University put forward successful experiences for

other developing urban agglomerations by comparing the transportation integration development history and characteristics of the three representative urban agglomerations in developing countries. (Jiang, 2016)

Japan's Tokyo urban agglomeration is relatively mature, and a decentralized network structure with multiple centers was proposed in 1985. Develop multiple economic centers in addition to Tokyo City, share regional functions, and develop multi-level rail transit networks to reduce transportation pressure on various lines. Among them, intercity public transportation connecting counties plays an important role in the development of urban agglomerations.

The New York urban agglomeration in the United States is the economic and trade center of the United States. It has experienced the development of an urban agglomeration from an initial center to multiple centers, developing a single economic belt into a multi-level and multi-center urban agglomeration economic circle. The social division of labor in each central city within the urban agglomeration is becoming clearer and clearer, but the connections are becoming closer and closer. The economic circles are intertwined and integrated, bringing convenience to passenger transportation and cargo transportation through the area. One of the representative systems is integrated transfer. Passengers can transfer with one ticket between road transportation such as private cars and buses and urban rail transportation.

The London urban agglomeration is the economic production center of the UK.With the rapid growth of its urban population and the rapid development of its city size, its urban functions are also spreading around the city of London and forming multiple economic circles. The interior of its urban agglomeration is dominated by highways and rail transportation, and transportation links are built between multiple cities to promote the integrated development of transportation, thereby promoting the economy.

2.2 Project Effectiveness in China

In China, urban agglomerations that developed earlier include the Yangtze River Delta urban agglomeration, the Pearl River Delta urban agglomeration, and the Beijing-Tianjin-Hebei urban agglomeration. In recent years, in the context of the development of new urbanization, cities such as Wuhan, Xi'an, Guangzhou & Foshan, and Chengdu have also begun to implement the integrated construction of metropolitan areas, allowing cities in the urban agglomeration to coordinate development in economic, social, and spatial aspects. The purpose is to enhance overall competitiveness, synergy and radiation capabilities through the joint allocation of various elements between cities, promote regional integration, and share the process of urbanization development (Xie, 2023).

In February 2020, the Chengdu-Deyang-Meishan-Ziyang Integrated Development Leading Group of Sichuan Province was established, and subsequently issued relevant policy documents such as the "Chengdu-Deyang-Meishan-Ziyang Integrated Development and the Construction of Chengdu Metropolitan Circle (2020-2022)" and the "Overall Plan for the Chengdu-Deyang-Meishan-Ziyang

Integrated Integrated Pilot Zone". With the support of various policies, the regional integration development of the Chengdu-Deyang-Meishan-Ziyang Urban Agglomeration is also an irreversible trend (Liu et al., 2023).

Based on the research foundation of various countries and the support of local policies in Sichuan, China, this paper takes the "Chengdu-Deyang-Meishan-Ziyang Urban Agglomeration" as the research object to analyze the role of transportation data integration in promoting regional coordinated development and provide confidence for subsequent sustainable development. The geographical location of the Chengdu-Deyang-Meishan-Ziyang urban agglomeration is shown in Figure 1.

Figure 1. Chengdu-Deyang-Meishan-Ziyang Urban Agglomeration

3. Methodology

3.1 Data Collection

The data in this paper mainly comes from statistical yearbook data of various local governments in China and online literature materials, including urban area, population, urban GDP, urbanization rate and other data. These data are statistically processed before being used.

3.2 Research Methods

The main research methods of this paper include literature review method and empirical analysis method.

(1) **Literature Review Method**

By systematically collecting, sorting and analyzing the literature and materials of various countries on the coordinated development of transportation integration and regional economy, we can understand the historical development process and current situation of transportation integration, and understand the main development directions and views, research methods and existing shortcomings of each country. Provide theoretical support and background basis for this research, thereby determining the entry point for the research.

(2) **Empirical Analysis Method**

Select a representative region-Chengdu-Deyang-Meishan-Ziyang urban agglomeration, collect relevant background data and data, and use statistical analysis and econometric methods to compare the coordinated economic development of the region before and after the implementation of the transportation integration project. This will further verify the role of transportation integration on the coordinated development of the regional economy, and conduct an empirical analysis of the relationship between transportation integration and the coordinated development of the regional economy.

For example, statistics on the change data of urban population ratio and GDP change data in the past three years of urban integration development, and reveals the specific impact of transportation integration on the coordinated development of regional economy through mathematical statistical analysis.

4. Results

During the three-year construction of the four cities of Deyang, Meishan, Ziyang, Chengdu, the transportation system of the urban agglomeration has also developed towards transportation integration and has made remarkable achievements. These project achievements have had a positive impact on promoting regional economic integration.

4.1 Rail Transit Construction Is Accelerating

(1) **Significant Progress Achieved in Urban (Suburban) Railway Projects**

The construction of municipal railways is being promoted on the connecting lines from Chengdu to Ziyang, Meishan and Deyang. The construction of these three city-wide railway lines has provided strong support for regional integrated development, shortened the connection between the urban agglomeration, shortened the mutual access time between cities, and thus promoted the coordinated development of the regional economy.

Chengdu-Ziyang Line S3: As an important part of the basic railway framework in the Chengdu Metropolitan Area, the Chengdu-Ziyang S3 Line project is progressing rapidly. The total length of the line is about 39 kilometers. As of the end of 2022, the construction of multiple key nodes has been completed, and more than half of the track project has been laid. The line has been fully connected in March 2024 and has entered the stage of rail laying across the entire line. The line is expected to be completed and opened to traffic in September 2024. The advancement of this project will greatly strengthen the transportation connection between Chengdu and Ziyang and promote regional integrated development.

Chengdu-Meishan Line S5: This line starts from Tianfu New District in Chengdu and ends in Meishan Dongpo District. There are 13 stations along the line, and the total length of the line is 59 kilometers. During the three-year operation period, the Chengdu-Meishan S5 line project has been steadily advanced, and construction of multiple stations has begun, laying a solid foundation for

subsequent opening to traffic.

Chengdu-Deyang Line S11: As an important rail transit line connecting Chengdu and Deyang, the Chengdu-Deyang S11 Line will start in 2022. The total length of the line is 70.87 kilometers (about 30.62 kilometers in Chengdu and about 40.25 kilometers in Deyang). There are a total of 15 stations on the line, and the running speed of rail vehicles is 160 kilometers per hour. The project is currently progressing smoothly, with multiple stations being fenced and gradually starting construction, contributing to the improvement of the regional rail transit network.

(2) **Initial Formation of Rail Transit Network Framework**

The Chengdu-Deyang-Meishan-Ziyang rail transit network skeleton centers on Chengdu and aims to build a multi-level and multi-standard rail transit network. The network realizes the "four-network integration" of trunk railways, intercity railways, urban (suburban) railways and urban rail transit. In order to meet the rapid commuting needs of residents in the region, promote the integrated development of the four cities of Chengdu-Deyang-Meishan-Ziyang, and build a metropolitan area on the track, the four cities of Chengdu, Deyang, Meishan and Ziyang have always focused on "building a large channel outside, building a large network inside, and building a large hub together" development ideas are focused on promoting the construction of rail transit. Based on the newly built and under construction rail transit projects, a rail transit network skeleton has been initially formed, providing strong support for this regional integrated development.

4.2 Continuous Improvement of Highway Network Construction

(1) **Increase in the Number and Mileage of Highway Passages**

The network planning content of highways and provincial roads in Sichuan Province is focusing on the four cities of Chengdu-Deyang-Meishan-Ziyang. During this period, a number of new highways and provincial roads were added around the region. For example, the Chengdu’s metropolitan circle ring road, Chengdu-Ziyang-Chongqing, Chengdu-Yibin, Deyang-Suining and other highway projects have been completed and opened to traffic, and the number of expressways in the region has increased significantly. This measure has effectively improved the interconnection level of regional road networks and further improved the density and accessibility of transportation networks in the region.

The total mileage of expressways in the four cities of Chengdu, Deyang, Meishan and Ziyang reaches 2446 kilometers, accounting for 27% of Sichuan Province, and the area density (7.4 kilometers/100 square kilometers) is equivalent to that of the developed areas in the east. This achievement not only improves transportation accessibility in the region, but also provides strong support for the construction of Chengdu's modern metropolitan area.

(2) **Eliminate "Dead Roads" and "Bottleneck Roads" in Border Areas**

During the three-year operation, the four cities of Chengdu-Deyang-Meishan-Ziyang worked hard to eliminate "dead roads" and "bottleneck roads" in the junction area. Through the construction, reconstruction and expansion of highway projects, 5 intercity fast lanes have been opened up and 10 dead roads have been connected, further improving the level of internal and external smoothness in the

region. This not only improves the traffic capacity of the regional road network, but also promotes inter-regional exchanges and cooperation.

4.3 Continuous Optimization of Public Transportation Services

(1) **Co-use Tianfu Tong Card (Code)**

Tianfu Tong Card (code) achieves mutually beneficial interoperability between the four cities of Chengdu, Deyang, Meishan and Ziyang, greatly facilitating citizens 'travel. By swiping the Tianfu Tong Card or scanning the QR code, citizens can enjoy convenient public transportation services in the area. Passengers traveling across cities no longer need to worry about changing cards or purchasing tickets, stimulating public transportation travel.

(2) **Increase in Cross-city Bus Lines**

The four cities of Chengdu, Deyang, Meishan and Ziyang continue to innovate bus operation models together and promote the docking of bus lines in junction areas. During the three-year operation period, a number of new cross-city bus lines have been added in the region, and 14 cross-city bus lines and 8 cross-regional customized passenger lines have been operated. The construction of cross-city bus lines provides citizens with more convenient and efficient travel options.

4.4 Continuous Growth in Comprehensive Transportation Investment

During the three-year operation period, the four cities of Chengdu-Deyang-Meishan-Ziyang planned to coordinate a total of 197 major projects, with a total planned investment of 816.99 billion yuan. Among them, comprehensive transportation projects, as one of the key promotion areas, have completed a total of 230 billion yuan in comprehensive transportation investment in three years, accounting for nearly a quarter of the total in Sichuan Province. The investment in comprehensive transportation in the four cities is not only used for infrastructure construction such as rail transit and highway networks, but also used to improve public transportation service levels. Through continuous investment and construction, the regional transportation system has been continuously improved and improved, effectively promoting regional integrated development, improving urban functions, and promoting economic development.

4.5 Coordinated Development of Regional Economy

During the three-year construction of Chengdu-Deyang-Meishan-Ziyang urbanization, the population in Sichuan Province is migrating to this urban agglomeration. While the total population of Sichuan Province dropped from 90.995 million to 90.675 million, the total population of the Chengdu-Deyang-Meishan-Ziyang urban agglomeration increased from 25.713 million to 26.219 million. The urbanization rates of all four cities have increased, among which the urbanization rates of Deyang, Meishan and Ziyang have increased more than the previous central city (Chengdu). This shows that the construction of multiple centers has reduced Chengdu's population pressure and attracted population to surrounding cities. Moreover, during the three-year operation period, the regional economy of the urban agglomeration developed rapidly. The total GDP of the urban agglomeration increased from 2.147948 billion yuan to 2.621804 billion yuan, a three-year increase of

as high as 22%, as shown in Figure 2.

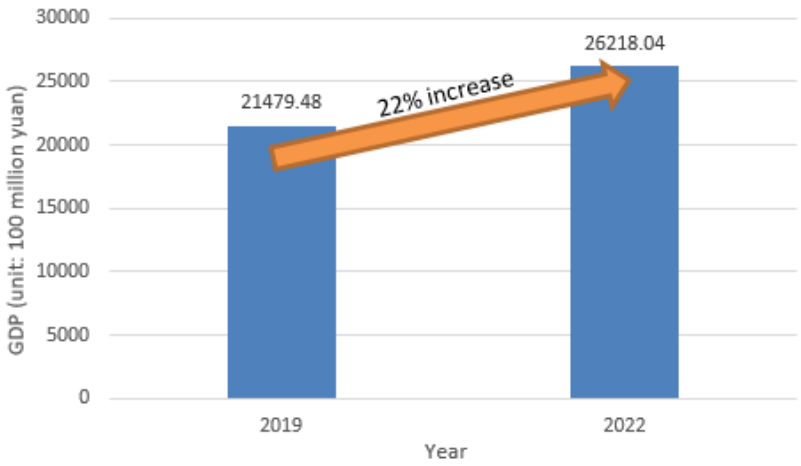

Figure 2. GDP Growth of Chengdu-Deyang-Meishan-Ziyang Urban Agglomeration

The positive impact of the integration of Chengdu-Deyang-Meishan-Ziyang transportation on the coordinated development of the regional economy is significant. It promotes regional connectivity, enhances regional attractiveness, and provides a series of project construction to inject new impetus into regional economic growth.

5. Discussion

The Chengdu-Deyang-Meishan-Ziyang Transportation Integration has various mechanisms such as improving transportation infrastructure, reducing intermediary investment and logistics costs, promoting regional economic integration development, promoting the free flow of production factors, and enhancing regional collaborative innovation capabilities. It has effectively promoted the coordinated development of the economy within the region.

5.1 Improvement of Transportation Infrastructure Promotes Close Connectivity between Cities

The improvement of transportation infrastructure is an important foundation for the transportation integration of the four cities of Chengdu-Deyang-Meishan-Ziyang. With the continuous extension and upgrading of the transportation network, the physical distance between cities has been effectively shortened, which directly promotes the close connection between the four cities. The improvement of transportation infrastructure not only shortens transportation distances and improves transportation efficiency, but also reduces transportation costs. This allows various production factors (such as products, capital, talents, technology, etc.) to flow and allocate more freely within the region.

5.2 Reducing Intermediary Investment and Logistics Costs

Improvements in transportation infrastructure can significantly reduce middleman investment and logistics costs. For example, the construction of rapid transportation methods such as highways and intercity railways has greatly shortened the transportation time of goods and reduced the in-transit time

and storage costs of goods. At the same time, the improvement of transportation networks has also promoted the agglomeration and development of logistics companies, further reduced logistics costs, and improved logistics efficiency. And based on the background of data sharing, the factory direct sales model replaces some dealer sales models, thereby reducing the cost of goods sales. These cost reductions provide more convenient conditions for the production and operation activities of enterprises in the region and promote the coordinated development of the regional economy.

5.3 Promoting Regional Economic Integration Development

Transportation integration is an important driving force for the development of regional economic integration. The interconnection of transportation networks breaks down administrative barriers and geographical boundaries between cities, making markets in the region more standardized and unified and platforms open. This will help form unified market rules and competition mechanisms, and promote the optimal allocation and efficient utilization of resources within the region. In addition, transportation integration has also promoted the development and utilization of tourism resources in the region, providing residents with richer tourism options and cultural experiences. At the same time, transportation integration has also promoted the division of labor and cooperation of industries in the region, formed a more reasonable industrial layout and industrial chain, and improved the overall competitiveness of the regional economy.

5.4 Promoting the Free Flow of Production Factors

Transportation integration promotes the free flow of production factors within the region. With the continuous improvement of the transportation network, production factors such as talents, capital, and technology can flow more conveniently within the region and be allocated more rationally. This will help form a more active market environment and innovation atmosphere, and promote the continuous emergence and rapid development of more new technologies and new industries. At the same time, the free flow of production factors also promotes exchanges and cooperation among enterprises in different cities in the region and promotes the coordinated development of the regional economy.

5.5 Enhancing Regional Collaborative Innovation Capability

Transportation integration has also enhanced collaborative innovation capabilities within the region. With the interconnection of transportation networks, innovative resources in the region (such as universities, scientific research institutes, enterprises, etc.) can be exchanged and integrated more easily. This will help form a more open and inclusive innovation ecosystem and promote the sharing and integration of innovation elements such as knowledge, technology, and information. At the same time, transportation integration has also promoted the rapid transformation and application of innovative results and promoted the sustained and healthy development of the regional economy.

6. Conclusion

In general, the Chengdu-Deyang-Meishan-Ziyang transportation integration actively promotes the process of urbanization and has also had a comprehensive and far-reaching positive impact on

promoting the coordinated development of the regional economy. Transportation integration not only accelerates the process of regional economic integration and optimizes the industrial layout within the region, but also makes the division of labor and cooperation between cities more reasonable. In addition, transportation integration also reduces transportation costs and intermediary investment, enhances the overall competitiveness of the regional economy, and improves the quality of life of residents in the region.

In the future, with the continuous deepening and expansion of the transportation integration process, the coordinated economic development of the Chengdu-Deyang-Meishan-Ziyang region will achieve more significant results.

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References

Jiang, C. (2016). Comparison and Reference of Transportation Integration Development of Major Urban Agglomerations at Home and Abroad. *Review of Economic Research*, *2016*(52).

Liu, J. L., Wu, Y., Liu, X. H., & Liu, Y. (2023). Research on the Development Status of Urban Integration of Metropolitan Areas Based on Multi-source Data—A Case Study of Chengdu-Deyang-Meishan-Ziyang. *Journal of Southwest University (Natural Science Edition)*, *45*(1), 123-138.

Sichuan Provincial Bureau of Statistics. *Sichuan Statistical Yearbook*. Chengdu: Sichuan Provincial Bureau of Statistics, 2023. Retrieved from http://www.tjj.sc.gov.cn/scstjj/c105855/nj.shtml

Xie, T. Y. (2023). *Study on the development countermeasures of Chengde Meizi co urbanization transportation from the perspective of Holistic Governan*. Southwestern University of Finance and Economics, China.