



Research on the Development Countermeasures of Road Freight Transport in Chengdu-Chongqing Economic Circle

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Abstract. The paper analyzes the characteristics and main influencing factors of comprehensive freight transportation in Chengdu-Chongqing Economic Circle. The research results show that the proportion of road freight volume in this area is 15.8%, 10.8% and 9.7% higher than that in coastal, border and inland areas respectively. The proportion of road cargo turnover is 33.8%, 5.9% and 9.5% higher than that of coastal, border and inland areas respectively. Finally, the paper puts forward targeted strategies to promote the development of road freight transport in Chengdu-Chongqing Economic Circle during the 14th Five-Year Plan period and provides decision-making basis for transportation management departments.

Keywords: Chengdu-Chongqing Economic Circle; Road · Freight Transport · Development Countermeasures

1 Introduction

Chengdu-Chongqing Economic Circle is the fourth pole to promote China's regional economic development in the future, and it is also an important growth point of economic and industrial development in the western region. In the future, with the deepening integration and development of regional economic industries in Chengdu-Chongqing Economic Circle, the demand for productive freight in this area will grow rapidly.

Different from Beijing-Tianjin-Hebei Region, Guangdong-Hong Kong-Macao Greater Bay Area and Long Triangle Economic Zone, the freight transport of Chengdu-Chongqing Economic Circle has typical inland characteristics, road freight bear more than 70% of all freight volume. In the context of carbon peak and carbon neutrality, the transportation needs to seek new development models in future. The special location advantages and transportation characteristics of this area determine that the future road freight development model should be studied and scientific decision-making.

2 Freight Structure Characteristics of Chengdu-Chongqing Economic Circle

2.1 China's Regional Characteristics of Comprehensive Freight Transportation

According to the geographical distribution characteristics of various provinces in China, the provinces in the country are divided into three categories: coastal areas (12 provinces), border areas (6 provinces) and inland areas (13 provinces). From the perspective of the distribution characteristics of freight volume by different modes of transportation, the road freight volume in the three types of regions is dominant, exceeding 70%, while the water freight volume in the coastal area is the second (23.2%), and the railway freight volume in the border area is the second (23.5%). The volume of railway and water freight in inland areas is roughly the same (10.3% of railway and 12.4% of water). Water cargo turnover in coastal areas is dominant (69.1% in coastal areas); the freight turnover in the border area is dominated by roads and railways (50.5% by roads and 49.3% by railways); inland areas are dominated by roads (46.9%). From Table 1, it can be seen that the structure of freight transport in various regions of China has both commonalities and differences.

2.2 The Road Freight Transportation Characteristics in Chengdu-Chongqing Economic Circle

In terms of road freight volume, the Chengdu-Chongqing Economic Circle accounted for 12.7% higher than the national average, 15.8% higher than the coastal area, 10.8% higher than the border area, and 9.7% higher than the inland area. In terms of road cargo turnover, this area accounted for 25.6% higher than the national average, 33.8% higher than the coastal area, 5.9% higher than the border area, and 9.5% higher than the inland area. Compared with inland provinces with a similar economic size, the road freight volume of this area is 10.7% higher than that of Hubei, which is comparable to that of Henan. The road freight volume of the area is absolutely dominant, and it has the typical transportation characteristics of inland provinces.

Table 1. Comparison of freight transport structure between Chengdu-Chongqing Economic Circle and other regions (2019)

Regions	Freight Volume Ratio (%)			Freight Turnover Volume Ratio (%)		
	Road	Railway	Water	Road	Railway	Water
National	74.3	9.5	16.2	30.8	15.6	53.6
Chengdu-Chongqing Region	87.0	3.3	9.7	39.2	17.2	43.6
Coastal areas	71.2	5.6	23.2	22.6	8.3	69.1
Border areas	76.2	23.5	0.3	50.5	49.3	0.2
Inland areas	77.3	10.3	12.4	46.9	26.2	26.9

3 Analysis on Influencing Factors of Regional Freight Transport Structure

3.1 Economic and Industrial Structure

Since 2012, the proportion of the added value of the tertiary industry in the province has increased by 13%, while the secondary industry has decreased by 11% and the primary industry has decreased by 2%. The proportion of the industry has continued to increase, which has led to great changes in the types of cargo transport. The proportion of bulk materials such as coal, ore, steel in the cargo structure has been decreasing year by year (Fig. 1).

The economic development of the Chengdu-Chongqing Economic Circle is mainly based on internal circulation, and the degree of dependence on foreign trade is low. In 2019, the proportion of regional foreign trade imports and exports to GDP was only 15.3%, far lower than that of economically developed provinces such as Jiangsu (43.5%), Zhejiang (49.5%), and Guangdong (66.4%). At the same time, the economic development of the Chengdu-Chongqing region is relatively less dependent on transportation. In 2019, the freight volume and freight turnover of the main lines (railway, waterway, expressway) per 10,000 yuan of GDP in the Chengdu-Chongqing region were calculated at current prices, they are 1.75 tons and 460.3 ton kilometers respectively, which are only 58.3% and 41.2% of the national average level, respectively, which are in the downstream level of the surveyed country (Fig. 2, Fig. 3). The circulation of factors of production in our province is mainly characterized by domestic demand and supply.

3.2 Cargo Category

In 2019, the main types of road transportation in Chengdu-Chongqing region were mining and construction materials and cement (46%), coal and products (9%), and metal ores (6%), with an average transportation distance of about 100 km. Among them, the proportion of mining and construction materials and cement is 7% higher than the national average, and the average transportation distance is only 75 km, which is in

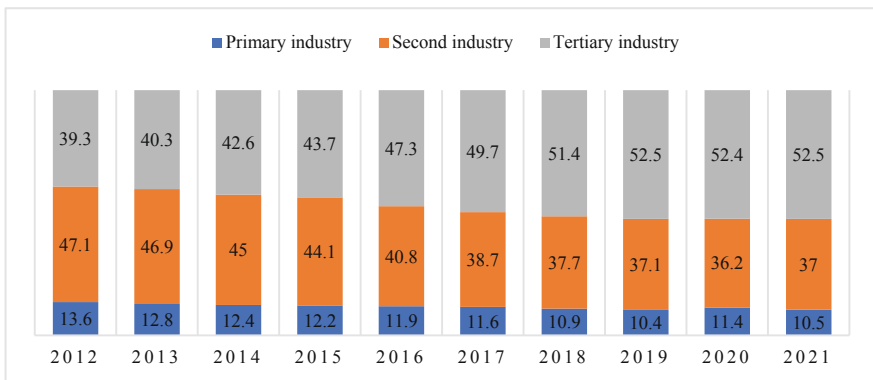


Fig. 1. The proportion of added value of three industries in GDP (2012–2020)

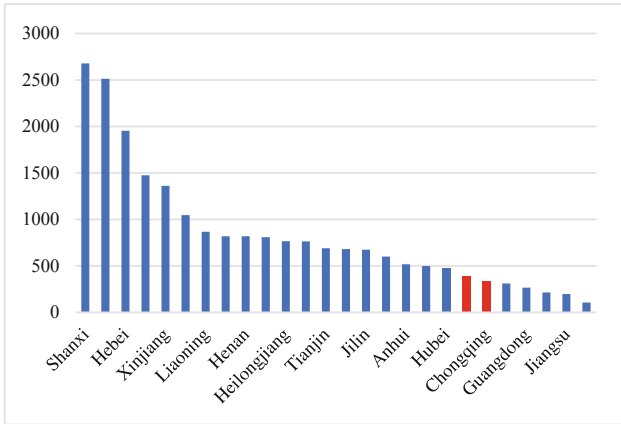


Fig. 2. Comparison of transport trunk freight volume per unit GDP (ton /10,000 yuan)

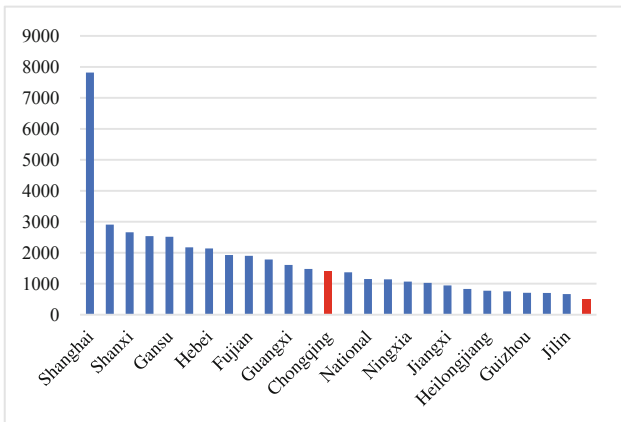


Fig. 3. Comparison of transport trunk cargo turnover per unit GDP (ton-kilometer/100 million yuan)

line with the actual situation that the Chengdu-Chongqing area is in the period of large-scale construction, and the mining and construction materials and cement are mainly provided by enterprises in the province; In addition, the proportion of coal and products and metal ore is 4% and 1% lower than the national average respectively, and the average transportation distance is only about 120 km. It can be predicted that compared with the whole country, the proportion of medium-sized rail goods in road transport is relatively low, and there will be less space for “return rail” for road freight in Chengdu-Chongqing region in the future (Fig. 4).

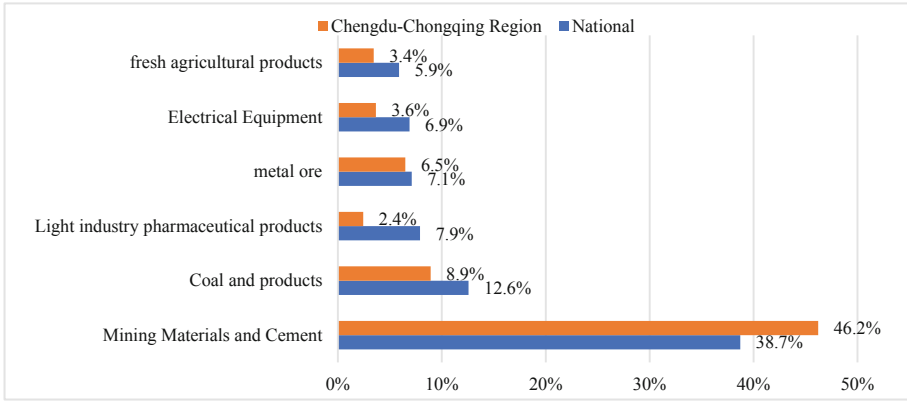


Fig. 4. Comparison of the types of freight transported in the Chengdu-Chongqing region and the whole country

Table 2. Advantageous distances of various cargo transportation modes (km)

Shipping mode	Road	Railway	Waterway	Air
Absolute advantage distance	50–480	480–1170	1170–3000	No advantages
Relative advantage distance	50–300	520–1000	2400–3000	1680–2280

3.3 Transport Distance

Statistical analysis results show that each mode of transportation has its own advantageous transportation range. As shown in Table 2, the absolute advantageous distance of road freight is 50–480 km, the relative advantage is 50–300 km, and the advantages are obvious in the range of medium and short distances; the absolute advantage of railway freight is 480–1170 km, relatively The advantageous transportation distance is 520–1000 km, which is suitable for medium and long-distance transportation; the absolute advantageous transportation distance of water freight is 1170–3000 km, and the relative advantageous transportation distance is 2410–3000 km, which is suitable for long-distance transportation; due to the high transportation cost of air freight, It does not have an absolute superior transportation distance, but has the advantages of fast transportation speed and short time. Therefore, as the transportation distance increases, its advantages gradually appear, and the relative superior transportation distance is 1680–2280 km. Roads occupy an absolute advantage in the range of medium and short-distance transportation (Table 3 and 4).

Compared with the whole country, the road transportation distance in Chengdu-Chongqing region is shorter and the railway transportation distance is longer. The average distance of railway freight is 1280 km, which is 1.86 times of the national average. The average transportation distance of road freight is 92 km, which is only 53.1% of the national average. The average transportation distance of expressway freight is 136 km, which is 12.2% lower than the national average (155 km). It can be seen that road

Table 3. Changes in the average distance of each Freight transport mode (km)

Time	Chengdu-Chongqing Economic Circle				National average			
	Road	Railway	Water	Air	Road	Railway	Water	Air
2016	107	1110	275	2170	183	1525	715	3330
2017	106	1180	330	2295	181	1480	730	3450
2018	105	1380	393	2180	180	1410	716	3550
2019	94	1280	444	2200	174	1390	688	3495
2021	101	1310	450	2120	170	1360	670	3320

Note: The cause of the epidemic in 2020, the data is abnormal, and no comparison is made

Table 4. Comparison of road and railway network scale and transportation volume in Chengdu-Chongqing Region (2020)

Transport Mode	Road network scale (km)	Freight Volume Ratio (%)
Expressway	8140	32.0
Ordinary roads (excluding village roads)	204300	61.7
Railway	4200	3.3

transport plays a more prominent role in short-distance freight transport in this area, while railways play a more important role in long-distance freight transport.

3.4 Transport Capacity

The road network occupies an absolute dominant position in the comprehensive transportation network. By the end of 2021, the road mileage in the Chengdu-Chongqing Economic Circle will reach 579,800 km, accounting for 96% of the comprehensive transportation network. Among them, the expressway plays the role of a major transportation channel. Although the process is only 1.5 times that of the railway, the freight volume it undertakes is 9.6 times that of the railway, and it is the main body of the “fast transportation channel”, Ordinary roads are the largest, most widely covered and most accessible network. It provides public welfare and universal transportation services for the society. It undertakes 62% of the freight volume of the whole society (excluding village roads). The foundation and core of the Internet.

3.5 Transport Prices

Compared with road transport, the management system of railway transport is relatively rigid, the degree of marketization is low, and it is hard to adjustment transportation prices. Although the railway transport volume is large, but the operate organization is complex and fixed, the waiting time for cargo collection is long, and the loading and

unloading transfer links are multiplicity, resulting in the railway transport having neither price nor time advantage. For example, if we transport a 40-foot container from Chengdu to Shanghai, the total cost of road-rail intermodal transport is about 16,500 yuan, which is 1.4–1.8 times the charge for returning empty vehicles from other places. The actual time consumption of road intermodal transportation is much greater than that of road “door-to-door” transportation.

4 Development Countermeasures of Road Freight Transport in the Chengdu-Chongqing Economic Circle

The Chengdu-Chongqing economic circle has typical inland regional transportation characteristics, and the future regional economic development requires road transportation as the main economic development carrier. Therefore, it is necessary to take a long-term perspective and make an overall plan for the sustainable development of regional road freight in future.

4.1 Promote the Cleaning of Transportation Equipment

In terms of policy guidance, vigorously promote the adjustment of transport structure, actively promote the development of multimodal transport of railway, road, and water containers, promote the standardization of containers, vigorously carry out technological innovation of transportation equipment, and encourage enterprises to increase the use of new energy, the improvement of energy-saving and emission-reduction technology, etc.

In terms of green equipment manufacturing, actively promote the renewal and transformation of standardized models of freight vehicles, encourage the use of new types of special vehicles such as new cold chain, hunchback transportation, cross-border combined transportation and special freight, and improve road network charging facilities. For example: the electrification of freight heavy-duty trucks (“heavy trucks”) in the early stages of development. Using the battery replacement mode or the integrated charging and replacement mode will have more advantages in specific scenarios such as short-distance transportation, mining areas, and ports with fixed routes.

4.2 Vigorously Develop Multimodal Transport

Actively promote intermodal transport services by road and rail, water transport, and aviation by market means, optimize the freight organization model, and improve the efficiency of transportation organization. Expand cross-border direct international road transportation services to Southeast Asia and Central Asia and cultivate cross-border road freight routes. Unify the laws and regulations, standards, and service rules for multimodal transport in Sichuan and Chongqing. Pilot the implementation of the “one bill of lading system” bill of lading intermodal service and explore the “one bill system” financial innovation.

4.3 Strengthen the Construction of Freight Information Platform

Relying on the construction of the province's comprehensive transportation big data platform, promote the intelligent transformation of freight hubs (logistics parks), and build modern smart logistics parks. Establish a freight information resource sharing and exchange mechanism in the Chengdu-Chongqing Economic Circle, unify standards and norms for data collection, processing, and exchange, promote real-time sharing of data across regions, fields, and industries, improve transportation collaborative governance and transportation service levels, and support this area.

4.4 Explore Differentiated Charging Policies

Further guide freight enterprises to improve the level of transportation organization, vigorously develop multi-axle large vehicles, promote the reduction of logistics costs, and implement differentiated expressway tolls for legally loaded trucks. First, the expressway tolls of ordinary road freight vehicles will be differentiated according to the principle of "decreasing distance". Second, the differentiated charges of international standard container tolls will be implemented. Container transport vehicles entering and leaving Luzhou and Yibin waterway ports will increase the expressway traffic. Favorable tariffs to promote the development of water supply intermodal transport.

5 Conclusion

Through the in-depth analysis of the impact of factors such as the economic industry composition, cargo category, transport capacity, transport distance, and freight rate on the transport structure of the Chengdu-Chongqing Economic Circle, it is found that for the typical inland area of Chengdu-Chongqing region, road is still the main freight transportation in the future. Under the background of the development of the new era, under the standard of 'carbon peak and carbon neutralization', the road freight transport in Chengdu-Chongqing region should vigorously develop multimodal transport, promote the cleanliness of transport equipment, strengthen the construction of freight information platform, and actively explore the freight differentiated charging policy. The paper Funded by Sichuan Provincial Department of Transportation Science and Technology Project "Research on Statistical Analysis of Comprehensive Transportation Volume in Sichuan Province (2019-D-05)".

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