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Research on Countermeasures to Promote the "Road-to-Rail" and "Road-to-Water" Shifts of Goods Transportation in Guizhou Province from the Perspective of Effectively Reducing the Overall Logistics Costs of Society

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Abstract: *Logistics is the "blood vessels" of the real economy, connecting production and consumption, and occupying an important position in the modern industrial system. Effectively lowering social logistics costs is an important measure to enhance the core competitiveness of industries and improve economic efficiency. Starting from the cognitive analysis of social logistics costs, this paper analyzes the differences and connections between logistics costs and social logistics costs, as well as between social logistics total costs and GDP ratio. Based on the current industrial structure, transportation structure characteristics, and logistics industry development level in Guizhou, this paper proposes that in the short term, to achieve lower logistics rates, one can take the following approaches: cultivating demonstration projects, adjusting transportation structure, developing hub economy, and promoting supply-demand matching, to solve the problems encountered in the transition from road to rail and road to water transportation, thereby achieving the optimization of transportation structure and the development of multimodal transportation, to effectively lower the social logistics costs in Guizhou Province.*

Keywords: *Social logistics costs from public to rail, public to water multimodal transport*

1. Introduction

On February 23, 2024, the fourth meeting of the Central Financial and Economic Affairs Committee pointed out that logistics is the "blood vessels" of the real economy, emphasizing the need to optimize transportation structures, strengthen the shift from road to rail and water transportation, deepen reform of the integrated transportation system, and form a unified and efficient, competitive and orderly logistics market, effectively lower the overall logistics costs, enhance the core competitiveness of industries, and improve economic efficiency. On May 11, the State Council held a regular meeting, calling for "further optimizing cargo transportation structures and actively promoting multimodal transportation." Logistics connects production and consumption, is an important component of modern industrial systems, and is an important lever for promoting domestic and international large-circulation. Nowadays, in various places, practices of new transportation modes such as "railway transportation" and "water transportation" are endless, and the high-quality development of "railway transportation" and "water transportation" has once again become a social hot topic. Guizhou Province, as an important node of the "Western Land and Sea New Channel," is a national land-based open economic pilot zone. Optimizing transportation structure adjustment and promoting "railway transportation" and "water transportation" are effective measures to further enhance the comprehensive transportation efficiency and lower logistics costs, as well as an important initiative to promote the formation of a unified, efficient, competitive and orderly logistics market.

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2. Correct understanding of social logistics costs

2.1. Logistics cost and social logistics cost

Logistics is based on actual needs, the basic functions of transportation, storage, loading and unloading, packaging, circulation and processing, distribution, information processing and other organic integration, so that goods from the supply to the receiving entity flow process. Then logistics cost is the monetary manifestation of materialized labor and living labor consumed in the above-mentioned logistics activities[1]. According to the international practice, logistics costs are generally composed of transportation costs, storage costs, management costs and so on. Logistics cost is a micro concept.

Social logistics cost, also known as the whole social logistics cost, the total cost of social logistics, refers to the sum of the expenditure costs of various aspects of the national economy for social logistics activities during the reporting period. In addition, the two words "cost" and "cost" in economics can be generally used, so the social logistics cost (or the whole society logistics cost, the total cost of social logistics) is equivalent in meaning to the social logistics cost (or the whole society logistics cost, the total cost of social logistics). Again, this is a macro concept.

2.2. The misunderstanding of social logistics cost understanding

The internationally accepted ratio of total social logistics costs to GDP compares the two indicators of total social logistics costs and GDP, reflecting the social logistics expenses required for a country to create a unit of GDP. It is used to measure a country's logistics efficiency and the development level of its logistics industry. Generally, the more developed and efficient the logistics industry is, the lower the logistics costs, and consequently, the lower the proportion of total social logistics costs in GDP. A lower proportion of total social logistics costs to GDP implies that, under the condition of creating the same scale of wealth, the labor consumed in the field of logistics activities is saved, which naturally contributes to improving the efficiency of the national economy. Additionally, logistics costs are transmitted through cost factors to the final prices of goods, exerting a positive impact on the general price level. Therefore, the proportion of social logistics costs to GDP is also related to the overall price level. For this reason, this indicator has long been widely concerned by all sectors of society[2].

In daily work, the indicator of "the ratio of total social logistics costs to GDP" is often used as a standard to evaluate the level of social logistics costs and is confused with logistics costs themselves. However, this indicator is unrelated to the direct costs of logistics itself. Different countries and regions have significant differences in resource characteristics, industrial structures, and industrial layouts, resulting in large variations in the volume of logistics operations (such as tons shipped and ton-kilometers of cargo turnover) generated per unit of GDP, with differences even reaching several times. For example, the current ratio of total social logistics costs to GDP in China is basically between 14%-15%, while this ratio is around 8%-10% in developed countries such as Europe and the United States[3]. However, it is unscientific to conclude that logistics costs in China are high based solely on this. Therefore, it is unfair and inaccurate to directly compare the proportion of total social logistics costs to GDP across countries as a measure of logistics costs. The ratio of total social logistics costs to GDP is influenced by various factors such as economic structure, logistics industry level, supply chain level, market efficiency, logistics tax and fee policies, and is a multi-dimensional indicator.

2.3. The way of limited social logistics cost

The ratio of logistics costs to GDP is not an indicator for measuring the level of logistics costs. Instead, the logistics cost rate per ton-kilometer is the key factor that determines the level of logistics costs. The logistics cost per ton-kilometer is a pure cost concept, referring to the unit cost incurred for transporting one ton of goods one kilometer (including transportation, warehousing, management, and other value-added services allocated to turnover, rather than simply the cost of transporting one ton-kilometer). For instance, comparing the logistics cost per ton-kilometer between China, the United States, and Japan, which are 0.8 yuan, 1.8 yuan, and 3.5 yuan respectively, does not necessarily mean that our social logistics costs are lower than those of the United States and Japan[4]. Due to factors such as market environment, cost and income levels, and consumption levels, direct comparisons of cost per unit of operation in a single logistics segment are not valuable. High social logistics costs do not necessarily imply that our logistics operational costs are also much higher than those of developed countries. Take e-commerce logistics and express delivery fees as an example; China significantly outperforms the United States in terms of delivery time and package integrity, while the cost of express delivery is less

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than one-tenth of that in the United States. Therefore, using social logistics costs as a criterion to evaluate the level of ton-based logistics costs will definitely lead to a misunderstanding of China's logistics cost issues, obscuring the real problems that need to be studied and solved, and even erasing the impressive achievements we have made in social economy and logistics transportation over the past few decades[5].

So, how can we reduce social logistics costs? It is crucial to place the logistics industry within the overall context of the national economy. We must avoid viewing logistics in isolation and simplifying it as merely reducing the service prices of logistics enterprises. Instead, we should take comprehensive measures based on the overall economic development and the modern logistics chain. This is a systematic project. According to China's national conditions, many experts and scholars propose that reducing social logistics costs involves developing new types of productive forces, optimizing industrial and product structures, and reducing structural logistics costs in the economy; transforming logistics supply chains, solidly developing modern supply chains, and reducing organizational and modal logistics costs; promoting the digital and intelligent transformation of the logistics industry, enhancing the modernization level of industrial and supply chains, and reducing operational logistics costs; and deepening market-oriented reforms to reduce institutional logistics costs related to administrative management.

3. The main factors affecting the social logistics cost in Guizhou

According to published data, in 2023, the total cost of GDP is 15.5%, social logistics cost or high (2023 in China logistics cost is 14.4%, Europe and America and other developed countries the proportion of 8%~10%), the logistics industry development can not effectively meet the high quality economic development and the overall requirements of the construction of modern economic system. This is the conclusion widely recognized and adopted by the competent departments at all levels and all sectors of society[6]. But also want to realize that after ten years of rapid development, logistics services in Guizhou province technical equipment level, intensive level, platform of digital development, realize the logistics efficiency greatly improve and cost reduction, the absolute cost of a single logistics operation link has been at a low level, direct compression space is very limited.

3.1. Guizhou logistics and transportation characteristics

Since the "13th Five-Year Plan", the construction of the modern circulation system in Guizhou province has been continuously expanding in scale, the network has been increasingly perfect, the efficiency has been continuously improved, and the logistics cost has decreased significantly. Although the results are obvious, a core data is still high: in the past five years, road transportation in Guizhou has accounted for more than 92%.

In 2023, in the proportion of railway and water cargo transportation, Guizhou highway was nearly 20 percentage points higher than that of the whole country, while the proportion of railway and waterway was 3 percentage points and 16 percentage points lower than that of the whole country respectively (see Table 1). The proportion of highway transport is high, while that of railway and waterway is low.

Table 1: The proportion of rail and iron cargo transportation in China and Guizhou in 2023

Ratio of transport volume (in 2023)	Driveway	Railway	Waterway
Nationwide	73.7%	9.2%	17.1%
Guizhou (Province)	93.4%	6.3%	0.3%

3.2. Structure characteristics of goods in Guizhou

According to the statistics of "Guizhou Transportation Logistics Data Report" jointly compiled by Guizhou Logistics Industry Association and Provincial Road Transport Bureau, 59% of the goods in the province are coal and mineral building materials. In these industries, road transportation, as the most important link in logistics activities, the transportation cost usually accounts for 2 / 3 of the total logistics cost. Low added value, high transportation cost, and unreasonable transportation structure, which naturally leads to the high social logistics cost in Guizhou Province[7].

Mineral resources are the unique advantages of Guizhou and provide a strong support for the economic development of Guizhou. Facing the requirements of the new era, Guizhou is actively seeking a new path of economic transformation and upgrading. This year in Guizhou province government work report to continue to clear, adhere to the "rich concentrate", the resource advantage into industrial advantage, is from the development of new quality productivity, optimize the industry and product

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structure, promote the development of industry from low-end to high-end, greatly increase the value of the unit weight goods, so even logistics still maintain the current equivalent price level, social logistics total cost and GDP ratio will fall sharply, this is the only way of low economic structural logistics cost in Guizhou, but the transformation and upgrading need a long time.

To sum up, in order to reduce the social logistics cost in Guizhou, on the one hand, it is necessary to improve the economic value of transportation goods, which is in line with the strategy of "extending the industrial chain and increasing the added value"; on the other hand, to promote the efficient integration of manufacturing industry and logistics industry, business and trade industry and logistics industry; finally, it is necessary to promote the standardization of the whole logistics link, open the logistics connection interface and achieve lower cargo circulation cost, which is the paper to reduce "logistics rate (ton km transportation cost)" from the adjustment of transportation structure. For Guizhou, in the short term, it is an effective solution to reduce the logistics rate, optimize the transportation organization, vigorously promote the 'public rail' and 'public water', and develop multimodal transportation to improve the transportation efficiency.

4. The development status of railway and water multimodal transportation in Guizhou

4.1. From the "hardware."

Guizhou boasts a road network density ranking among the top nationwide, yet its railway and waterway densities remain relatively low.

Railway: First, the main line channel still has short links. Although the main skeleton of the channel has been basically formed, there are still some trunk lines to be accelerated through the completion, and some sections have the problem of capacity tension. For example, the Huangbarrel to Baise railway, as an important part of the western route of the new western land-sea channel, is still in the preliminary stage due to the overall transportation demand of the channel and the coverage of economic strongholds along the route[8]. Second, the "one kilometer around" construction needs to be strengthened. At present, the railway freight network in the channel is not coordinated, "before and after one kilometer" transportation is not smooth problem is more prominent. On the one hand, some old railway branch lines in the province are idle and inefficient; on the other hand, under the background of the traffic growth, the "one kilometer" of the logistics park enterprises and some port branch lines is still imperfect.

Waterway: First, the high-grade channels above grade 4 in the province only account for 17.7% of the navigable mileage, and the channel system connecting trunk and branches has not yet been formed. Due to the limitation of the navigation facilities of Gouitan, Silin, Shatuo and Pengshui, the navigation time is long, the shipping vessels are small, high cost, and the transportation efficiency is low; second, the comprehensive supporting facilities are insufficient, the provincial terminals are mainly small and medium-sized, backward loading and unloading technology and low mechanization degree account for a large proportion; most of the terminals lack supporting professional warehouses and freight terminals; the lack of LNG filling terminals, shore-based gas stations and port power facilities are not perfect.

4.2. From the "software."

Currently, Guizhou lacks a multimodal transport operator with cross-modal operation and full-chain integration capabilities, significantly reducing the coordination level of transport organization. Furthermore, to achieve intermodal transport, information must first flow smoothly. However, the mechanism for information interconnection and sharing among departments, enterprises, and regions needs to be improved, with the phenomena of "information islands" and "data broken chains" being quite common.

Two-thirds of the cities (states) are not covered by the multimodal transport hub market. At the same time, most of the hub terminal exist "adjacent" and "poor" phenomenon, not form efficient cohesion between different modes of transportation, need through a series of transfer operations to complete the whole multimodal transport process, weakened the multimodal transport in timeliness and logistics costs, greatly reduces the transportation efficiency.

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5. Suggestions for Promoting the "Road-to-Rail" and "Road-to-Water" Transitions in Guizhou Freight Transport

5.1. Cultivate demonstration projects with projects as the carrier

(1) Prepare for the reserve and storage of multimodal transport projects. Based on the principle of independent declaration, priority should be given to the projects that meet the advantage complement chain to be included in the project database management, and the projects in the database should be included in the 15th Five-Year Plan[9]. Pilot and demonstration projects related to multimodal transport such as the national multimodal transport demonstration project are selected from the project reserve and cultivation database and actively integrated into the national strategy. With projects as the carrier, we will pay close attention to the cultivation and demonstration of multimodal transport projects, so that more demonstration and pilot projects will emerge in the province.

(2) Carry out the pilot project of "network freight transport + multimodal transport" for multimodal transport. Select the demonstration project of container rail and water multimodal transport, carry out the network freight mode, and the whole transportation process is responsible for by the network freight. The "one box" full chain service mode of "one order to the end", "whole process responsibility" and "no change, no unpacking, one box to the end" has been implemented. Guizhou local banks, insurance and other institutions are encouraged to explore the innovation of "one order system" digital bill of lading credit business, "one order system" whole-process combined transport insurance, and "one order system" financing mode, etc.

(3) Select leading enterprises to build an open and sharing network freight platform. First of all, support Guizhou multimodal Transport Company, Commercial Reserve International Supply Chain Company and other existing multimodal transport enterprises above the scale to build regional multimodal transport network freight demonstration platform based on their own business, through information collection, and then further promote the provincial multimodal transport information exchange and sharing platform.

5.2. Problem-oriented, adjust the transportation structure

(1) Set up the special work class of "public to water, public to iron". The comprehensive transportation structure adjustment involves "highway, iron and water" and other fields, and is in charge of different units. A provincial working mechanism for transport structure adjustment led by the Department of Transport with the participation of the Provincial Development and Reform Commission and China Railway Chengdu Bureau Group has been established. A special working team has been set up across departments to strengthen the work coordination of departments, and timely study and introduce systems and policies conducive to the development of multimodal transport. Under this mechanism, provincial working agencies and transportation enterprises can communicate "point-to-point" and coordinate multi-linkage between railways, localities and enterprises. Such "special classes" encourage cities and states to also explore.

(2) Improve the overall transportation capacity of the railway channel. Focusing on opening up the missing sections, planning the fast freight railway from Renhuai to Xishui, reducing the logistics cost of Zunyi sauce-fragrant wine and its raw materials, planning the fast freight railway from Nayong to Lanba, promoting the development of mineral resources from Zhijin to Nayong, transforming its resource advantage into economic advantage; constructing the special line from Huanghua to Baise fast freight railway to sugarcane in Hong Kong to form the "iron-water" cargo transport hub from Chengdu-Chongqing to Guangzhou and the "public-iron-water" multimodal transport logistics hub from Guizhou to Guangzhou.

(3) Promote the construction of high-grade waterways. To speed up the wujiang river advanced channel extension engineering and construction of three channel, further extend the hinterland of wujiang river main channel, construction as soon as possible, sand Lin power station navigation hub second line 1000 ton ship facilities and jinjiang reed home hole power station hub navigation facilities such as infrastructure construction, further improve the service ability of channel network. We will strengthen the construction of infrastructure and specialized deep-water ports such as Sinan, Yanhe and Dejiang ports, and build ports that are open to Hunan, Chongqing, Hubei, Guangxi and Guangxi.

(4) Strengthen the construction of the collection and distribution system. We will give full play to the role of multi-level governments to solve obstacles to the collection and transportation of ports and railway

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terminals. Around the highway, railway, waterway, aviation and other freight infrastructure into the station station, into the port wharf, into the park, excavate the county has a special railway line potential. In principle, logistics parks, industrial and mining enterprises and grain storage warehouses with an annual volume of more than 1.5 million tons of coal, ore, coke and other bulk goods newly built or relocated should be connected to special railway lines or pipelines.

(5) Make good use of the national large-scale equipment renewal and transformation policy opportunities. We will accelerate the elimination of the stock of non-standard freight vehicles and encourage the application of medium axle vans and other standard freight vans[10]. Actively promote the intelligent logistics equipment of leading intelligent logistics enterprises, and encourage qualified enterprises to upgrade their equipment. We will support enterprises and groups to actively participate in the research and formulation of higher group standards and enterprise standards in accordance with Guizhou's characteristics, accurately connect with multimodal transport infrastructure, and improve the level of standardization.

5.3. Take efficiency as the center and develop the hub economy

(1) Actively apply for the construction of a national China-Europe freight train assembly center. Central trains has become a strong support of Guiyang and surrounding areas into the circulation, take this opportunity to support Guiyang international land port, Guiyang qingzhen international land port as an extension of the coastal port function in the inland, the construction of multi-dimensional bonded logistics system, build "dry branch, hub distribution" efficient transportation system, actively build "national central trains assembly center" improve service ability and level, boost the province opening to the outside world and foreign trade quality development to a new level.

(2) Strive to enhance Guizhou's hub status. Strengthen cooperation with RCEP countries, support provincial operating companies in China to layout and build overseas assembly centers, and provide a new platform for foreign trade enterprises in the province to deeply cultivate overseas markets. Strengthen cooperation with coastal ports, promote the iron sea transport, iron transport cooperation, attract more transit and return supply by Guiyang, to "trains +" for the gripper, through "old trains + central (central Asia) trains" transit mode, promote the western Lu Haixin channel trains set operation, form of high frequency, high aging stability of iron transport network, helping Guizhou to speed up into the global division of labor, become a large bay area and Chengdu-Chongqing economic zone, the Yangtze river economic belt and the important hub of the pearl river-xijiang economic belt.

(3) Create a new path for customs clearance cooperation. We will make full use of the pan-Pearl River Delta regional coordination mechanism, implement the cooperation initiative of "customs, port and railway zones" together with ports, railways, pilot free trade zones and other units, and jointly promote the connection of logistics nodes in the Pan-Pearl River Delta region. We will promote the establishment of a new mode of integrated customs clearance with inland ports and border port departments, as well as an emergency response and coordination mechanism, centrally share resources of all parties, and continuously reduce the cost of China-Europe freight trains and whole-process logistics.

5.4. Take the market as the main body, and promote the connection between supply and demand

(1) Promote the shift of bulk cargo transportation from road to rail. Support multimodal transport operators to actively understand and help customers solve difficulties and problems encountered during the process of freight train shipments through methods such as door-to-door visits and invitations, tailor-made transportation solutions, and provide high-quality services[11]. Guide and encourage cities and prefectures within the province to develop railway freight trains, road-rail combined transportation, and other modes, promote the exploration of road-to-rail transportation for bulk cargo such as coal, ore, and cement, and advance the green transportation model of "railway trunk line + new energy heavy-duty truck transfer".

(2) Promote the shift from road to water transportation along rivers. Guizhou's resource-rich regions are closely connected to water transportation channels, aligning well with the flow of goods. The coal resources in Liupanshui City and Qianxinan Prefecture are distributed along the Beipanjiang and Nanpanjiang rivers. Locating the coal chemical industry along these rivers can provide industrial water while also meeting the long-distance transportation needs for coal raw materials and coal chemical products to Guangxi and the Pearl River Delta region[12]. Zhijin, Qianxi, and Xifeng can establish coal chemical industry parks along the Wujiang River, utilizing its high-grade navigation channel to transport coal chemical products to economically developed regions along the Yangtze River basin. The phosphorus mining and phosphorus chemical industry in central Guizhou can also be laid out along the

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Wujiang River's golden waterway. Efforts should be made to vigorously promote Wujiang River water transportation, while mobilizing relevant enterprises to support Wujiang River water transportation efforts, encouraging a portion of goods to be transported via this route to personally experience its benefits and convenience. Manufacturing enterprises are encouraged to adopt "bulk to container" transportation, and shipping and logistics enterprises are supported to formulate reasonable transportation plans, providing customers with "bulk to container" transportation solutions, effectively increasing the proportion of road-to-water and bulk-to-container transportation, and further enhancing container logistics service capabilities.

(3) Expanding Overseas Markets: Focusing on the twelve key industries in Guizhou, we will promote the clustered development of industries, further diversify the types of freight trains, and facilitate the "export of Guizhou goods" and "import of overseas goods into Guizhou." [13]Taking advantage of Guiyang's efforts to establish itself as a "regional international consumer center city," we will extend the service chain to create an operating model featuring "direct overseas procurement + freight train transportation + bonded warehousing + direct purchase at service areas," primarily focusing on specialty products from countries involved in the Belt and Road Initiative. This will enhance the scale of operation for specialized freight trains, including customized freight trains, cross-border e-commerce, cold chain logistics, and integrated transportation and trade services[14].

6. Conclusions

Effectively reducing logistics costs across society is a crucial measure for promoting high-quality economic development. From the perspective of "effectively reducing logistics costs across society," promoting the shift from road to rail and road to water transportation for goods in Guizhou holds significant strategic importance. By optimizing the transportation structure, Guizhou can further enhance overall transport efficiency, reduce logistics costs, and facilitate the formation of a unified, efficient, and competitive logistics market. The countermeasures and suggestions proposed in this paper, such as planning and constructing rapid cargo railways and developing multimodal transportation, aim to address logistics bottlenecks and reduce the cost of goods turnover and circulation. These measures not only help improve the overall level of logistics services in Guizhou but also enhance the core competitiveness of industries and improve economic operational efficiency. In the future, with the in-depth promotion of the "shift from road to rail and road to water" initiatives, Guizhou will gradually establish a more comprehensive modern logistics system, providing strong support for economic and social development. At the same time, this will also offer valuable experiences for other regions to learn from, jointly contributing to the effective reduction of logistics costs across society.

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