Supply-Side Reform of Beijing-Tianjin-Hebei Freight Transport Based on the Perspective of Structural Dimension

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Keywords: Structural dimension, SCP paradigm, Beijing-Tianjin-Hebei, Freight transport structure, Supply-side reform of freight transport.

Abstract. Supply-side reform has become the compass of China's reform and development. The transportation structure in the Beijing-Tianjin-Hebei region has the structure attribute of road transportation in the aspect of freight transport, so the supply-side reform of freight transport is one of the focuses and directions of the supply-side reform of transportation. Taking Beijing-Tianjin-Hebei region as the regional representative, this paper first analyzes the current situation of cargo transportation structure in the Beijing-Tianjin-Hebei region, which shows that road transportation plays a dominant role in freight transport. Then, based on the perspective of structural dimension, combining the theory of industry economics SCP paradigm, this paper discusses the key point of supply-side reform of Beijing-Tianjin-Hebei freight and conclude that medium and long-distance freight transport should be transferred by road to railway and water transport in the Beijing-Tianjin-Hebei region. And it is necessary to establish a comprehensive multi-modal transport system, which mainly based on railway transport, to optimize the transportation structure and improve the performance of the transportation.

Introduction

In 2018, President Xi ordered at the first meeting of the Central Finance and Economics Committee that the transportation structure should be adjusted to reduce the road transportation volume and increase the railway transportation volume. In June, the premier also deployed strategic tasks at an executive meeting of the State Council, aiming to improve comprehensive transport efficiency by adjusting the transport structure. Based on the requirements of this national development strategy, the Ministry of Transport has formulated an action plan to achieve the goals of transportation restructuring within three years. It indicates that there are serious structural problems in China's comprehensive transportation system, and the supply-side reform process of cargo transportation needs to be accelerated.

Theoretical Basis and Literature Review

Theoretical Basis—SCP Paradigm

The structure-behavior-performance analysis paradigm (SCP paradigm for short) of modern industrial economics was first proposed by Mason, a representative of Harvard school, and further improved and popularized by Bain and Schiller\(^1\). The introduction of SCP paradigm was a sign of the establishment of modern market structure theory, and the western traditional industrial organization theory was further improved. The model provides an analysis framework which can analyze the internal operation mechanism of each link and the whole system. This paradigm holds the view that the industrial structure determines the competition status of the industry and the behavior and strategy of the enterprise, then ultimately determine the performance of the enterprise. There is a two-way causal relationship between the structure, behavior and performance (refer with: Fig. 1). The logical diagram of SCP paradigm is as follows.
Literature Review

The current research on supply-side reform is still hot. The research themes mainly include services, manufacturing, agriculture and education industry. The transportation industry is part of the service sector, but the existing research is less, and mainly concentrated on a single city (Beijing and Shanghai) and the supply-side reform of the city public transportation.

To sum up, the current research focuses on the supply-side reform of urban public transportation and regional intercity transportation. Liu Lihong, Li Hongchang et al. (2017)\(^2\) pointed out that the supply-side reform of transportation should include the structural transformation of supply, but the explanation of the optimization of freight structure was not in-depth. Xu Jiagen and Chen Ke (2011)\(^3\) used SCP paradigm to analyze the market structure and bank performance. Therefore, this paper uses SCP paradigm to analyze the supply-side reform of cargo transportation in Beijing-Tianjin-Hebei region to supplement the research in this field.

Analysis of the Current Situation of Cargo Transportation Structure in Beijing-Tianjin-Hebei

Current Situation of Cargo Transportation

In 2017, road freight volume of Beijing-Tianjin-Hebei accounted for 81.1%, 65.5% and 90.4% of the total freight volume respectively (refer with: Fig. 2, Fig. 3, Fig. 4).

![Figure 2. Beijing cargo transport structure.](image)

![Figure 3. Tianjin cargo transport structure.](image)

![Figure 4. Hebei cargo transport structure.](image)

![Figure 5. Regional cargo transport structure.](image)
From a regional perspective, road freight volume of Beijing-Tianjin-Hebei region accounted for 85.36% of the total freight volume (refer to Fig. 5), indicating that the road transport dominated the cargo transport system. Specially, the port bulk cargo transportation is mainly by road. In addition, according to Gaode's statistics in 2018 Q1, the truck traffic volume in Beijing-Tianjin-Hebei is the highest in China.

Analysis of Problems in Cargo Transportation

The core problem of unbalanced transportation structure of goods in Beijing-Tianjin-Hebei region is mainly reflected in the following aspect: road transportation and railway transportation have different advantages and different transportation tasks. For short-distance and door-to-door transportation, highways have greater advantages because of their high accessibility and flexibility. For medium-long distance transportation, railway transportation has comparative advantages in the following two aspects:

1. Railway transportation is cleaner and more environmentally friendly. For highway transportation, highway freight vehicles are large energy consumption and emissions units, especially medium and heavy diesel trucks. The energy consumption and pollutant emission per unit cargo turnover of highway are about 7 times and 13 times that of railway [4].

2. Railway transportation is more convenient to manage, with large transportation capacity and low transportation cost. Compared with road transportation, railway transportation is more adaptable to different climates. Due to its special vehicle structure, the increase in transportation volume reduces the cost. In addition, due to the large size of its carriages, railway transportation can carry almost any goods without the limitation of commodity types.

In general, compared with highway transportation, railway transportation has many advantages. The supply-side reform of freight transport in Beijing-Tianjin-Hebei region should focus on exploring the comparative advantages of railway freight transport, building a comprehensive multimodal transport system based on railway transport [5].

Adjustment and Reform of Cargo Transportation Structure in Beijing-Tianjin-Hebei Based on SCP Paradigm

Analysis of Cargo Transport Structure

The structure discussed by the traditional SCP paradigm is usually quantitatively analyzed through the measurement of common market structure indicators. According to the special nature of cargo transport and research purpose, structural analysis is based on the proportion of various freight modes. From 2012 to 2017, highway freight volume increased from 78.02% to 85.36%. The distortion of regional transport structure of goods is also reflected in the severe shrinkage of market share of railway freight. The main reasons include the increase of prices and investment mainly used for passenger transportation [4]. With the rapid development of modern logistics market, due to its rigid management mechanism, it’s difficult for railway freight transport to adjust according to the market. Railway freight transport has comparative advantages over road freight transport in terms of medium-long distance freight transport. The certain irrationality showed from the structural dimension would affect the regional freight transport behavior and performance.

Analysis of Cargo Transport Behavior

According to the SCP paradigm, there is a two-way influence relationship between the market structure and market behavior. In this part, the freight market adjustment behavior of railway transportation and highway transportation is mainly used for analysis.

From 2002 to 2015, rail freight prices have been raised 12 times, from 4.45 cents each ton-km to 15.51 cents, an increase of about 3.5 times (refer to Fig. 6). Considering the relevant railway construction funds, for the railway freight transport less than 1000 km, the actual transport cost borne
by the shipper has no comparative advantage over road freight. In addition, there is always the problem of irregular order in the market of goods transportation, such as illegal modification of vehicles and serious overload, which makes road freight more advantageous in price.

**Analysis of Regional Freight Performance**

It can be seen that railway transportation is more suitable for the transportation of medium and long distance bulk goods. Because its transportation cost is lower, and the corresponding social external cost is smaller than road transportation of goods. Road transportation has a price advantage and higher transportation performance in short distance transportation. Compared with the current situation of freight transport structure in Beijing-Tianjin-Hebei, it can be found that the regional freight transport does not reach the optimal configuration because of distortion of regional freight structure.

The improvement of regional freight performance is based on making use of comparative advantages of railway transportation and highway transportation. Railway has the advantages of low pollution, large transportation capacity and low transportation price in the transportation of medium and long distance bulk goods, while highway transportation has the characteristics of accessibility and flexibility in short distance transportation. We will adjust the freight transport structure of Beijing-Tianjin-Hebei region to form a reasonable regional cargo transport structure and thus improve the efficiency of regional cargo transport (refer with: Fig. 7).

**Conclusions**

Based on the data of the statistical bulletin from 2012 to 2017 and the analysis of SCP paradigm from the perspective of structural dimension, this paper concludes that the adjustment of cargo transport
structure in Beijing-Tianjin-Hebei region will have an important impact on the performance of regional transport structure.

Firstly, the task of supply-side reform is to optimize the structure of the carriage of goods. For long-haul transportation, it is necessary to promote the development of railway freight of commodities, reduce the highway transportation in the proportion of long-haul transport. Secondly, through the supply-side reform of goods transportation, it guides and even creates the freight demand of consumers, and realizes the supply of high-quality products and services, thus affecting the “goods transportation behavior”. Based on the analysis of SCP paradigm, the supply-side reform of cargo transport changes the performance of cargo transport system in Beijing-Tianjin-Hebei region by affecting “cargo transport structure” and “cargo transport behavior”. It also pays more attention to meeting the requirements of ecological transport development in the new era.

References


