Analysis of the problems in China's railway freight pricing system

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Abstract. The fundamental changes in China's market structure have ushered in the development opportunity for the cargo transport market and prompted fierce market competition. In this economic environment, the perfection of railway freight pricing system directly affects the market competitiveness. Through sorting out the change course of China's railway freight pricing management mechanism, this paper analyzes the current situation of freight pricing management mechanism, expounds the freight pricing system. On this basis, the problems of the pricing system are explored, which provides theoretical basis and technical support for improving the railway freight pricing system and deepening the reform of the freight rate mechanism.

1. Introduction
Since June 15, 2013, China Railway has been implementing the freight organization reform. A series of reform contents and measures have been introduced successively, further improving the railway freight pricing system. As the focus of railway transportation economy, the pricing of railway freight has always been concerned by scholars. Huifeng Du analyzed the current situation of railway freight rates in Russia, Japan and other countries, and determined their pricing strategies [1]. Bitzan J D and Keeler T E studied the reform process and evolution of freight pricing in the United States, and proposed to change the regulatory mode of the government to benefit railway enterprises and users [2]. Newton DE Castro introduced the impact of railway freight on Brazil's national economy and described the pricing reform of railway freight in Brazil [3]. Yue Zhang quantitatively analyzed the freight rate of railway goods and divided it into government reference price, government guidance price and market competition-oriented freight rate [4]. Ji Liang analyzed the current situation of China's freight rate mechanism and pointed out the deficiencies in the management system, formation mechanism and composition of freight rate [5]. Liqiang Yu pointed out that China's current railway freight rate had lag problems in the formation mechanism, structure, price adjustment and other aspects of reform [6]. In the paper, Chu Wang gave three suggestions on the reform of freight rates [7]. Most of these researches focus on the reform of railway freight pricing.

Based on this, this paper will introduce the changes of China's railway freight rate management mechanism, the current railway freight rate structure, freight rate form and freight rate calculation, and analyze the existing problems of China's current railway pricing system.

2. The changing course of freight rate management mechanism in China
Based on China's basic national conditions and historical development process, as well as the research of Guoli Ou [8] and Xiaojuan Liu [9]and relevant documents issued by the National Development and
Reform Commission, it can be analyzed that China's railway freight rate management mechanism has gone through four stages since the early days of the founding of the People's Republic of China.

2.1. The first stage: the highly centralized control stage from 1949 to 1982
After the founding of the People's Republic of China, in order to stabilize economic development and ensure the smooth implementation of the first five-year plan, the government unified the price of railway freight nationwide for the first time in June 1955, with an average price of 0.0165 yuan / (T·km). Then the freight rate was reduced in 1961, 1962 and 1967 respectively, and the final freight rate was reduced to 0.01438 yuan / (T· km), with an adjustment rate of more than 10%. Since then, China has implemented a long-term low freight rate policy. Under the planned economy at that time, although the low freight rate policy promoted economic construction and social development to some extent and satisfied some transportation demands, the long-term implementation of the low freight rate policy was not conducive to the balance between supply and demand of market transportation and hindered the long-term development of railway freight.

2.2. The second stage: the deregulation stage from 1982 to 2002
With the transition of China's planned economic system into a market economic system, railway transport enterprises have gradually relaxed price controls, and made a series of adjustments to the railway freight transportation rates, which has enabled the rapid development of railway freight rates and gradually realized the transformation from government pricing to government guiding prices. During this period, the adjustment of railway freight rates has gradually increased, which is in line with the economic development needs at that time. The adjustment measures include short-distance surcharges, railway construction fund fees and electrical surcharges. The diversified railway freight rate enriches the railway freight rate system, promotes the development of railway freight, and makes railway transportation enterprises better adapt to the changes of market demand.

2.3. The third stage: rapid adjustment stage from 2003 to 2013
With the continuous improvement of the socialist market economic system, the railway transportation industry needs to adjust and optimize the freight rate management mechanism according to the conditions of the freight market. It will ease the multi-party competition and management pressure suffered by the railway industry. Therefore, it is particularly important to accelerate the reform of railway freight rate and improve the freight rate mechanism to meet the requirements of market development and competition. At this stage, the railway will charge a new freight rate of 0.0011 yuan / (T·km) and the freight rate will be increased to 0.1151 yuan / (T· km), and the cargo operation price will be raised to 0.0821 yuan / (T· km), the construction fund has been maintained at 0.033 yuan / (T· km) since 2007. At this stage, China's railway freight pricing system gradually differentiates from the unified pricing to a certain degree of flexibility and flexibility. The transformation of the system has added vitality to the development of railway freight transport.

2.4. The fourth stage: the exploration stage of market-oriented freight rate reform from 2013 to now
Since February 20, 2013, the freight rate of national railway goods has been increased to 0.1301 yuan / (T·km), among which the freight operating price has been increased to 0.0971 yuan / (T·km). In March, the Ministry of Railways was reformed and split into three parts. Since then, the railway industry has been separated from government and enterprises, and railway freight prices have entered the market exploration stage. In June of the same year, China Railway Corporation carried out the reform of freight organization. The Railway Corporation had some independent pricing power and price adjustment rights. According to the changes of market demand, some freight prices could be adjusted independently, which improved the market competitiveness of railway freight to some extent. In 2014, the National Development and Reform Commission issued the document No. [2014] No. 210, which decided that the freight rate of the state railway was increased to 0.1541 yuan / (T·km) from February 15, 2014, in which the operating price of the goods was increased to 0.1121 yuan / (T·km) and the freight rate of
the railway was successfully changed from the government pricing to the government guiding price. In 2015, the freight price was adjusted again to 0.1551 yuan / (T · km), which was taken as the base price. The price could be set independently within the range of no more than 10% floating up and down. On December 26, 2017, the National Development and Reform Commission issued the document NO. 216 on the development and reform price [2017], puts forward some goods transport regulation by market price by the railway transport independent pricing, and stressed that the electricity surcharge into China’s Railway unified freight, rail transport of goods the benchmark price of the same, no more than 15% in floating, down an unlimited range can be independent pricing. Starting from 2018, fees related to railway freight transport will be cleaned up and standardized to promote the adjustment of transportation structure.

At this stage, the state further relaxed the control of railway freight rates, constantly tried to change the railway freight prices from government-guided prices to market-oriented independent pricing, and gradually realized the goal of market-oriented reform of railway freight.

3. China's railway freight pricing system

3.1. Freight composition

According to the "Rules for Railway Freight Rates", China's current railway freight transport prices are mainly composed of unified prices, power surcharges, transportation miscellaneous fees and railway freight transport extension service fees. [10].

3.1.1. Uniform freight rate. Since June 1955, when China first unified railway freight rates, the National Development and Reform Commission has issued a series of documents to adjust the unified freight rates. At present, the unified freight rate adopted by China's railway freight is determined according to the document no. 183 [2015], and the unified freight rate of railway freight is increased to 0.1551 yuan / (T · km). On this basis, it is proposed in document no. 2163 [2017] that railway transport enterprises can set their own prices based on the market supply and demand by taking the base price as the basis, which shall be subject to the requirement that the upward price shall not exceed 15% and the downward price shall be unlimited. With the continuous development of freight reform, the composition of uniform freight rate has been changed from three parts to two parts, reducing the new road and new price to share the freight.

(1) Operating price

According to the different application scope, China's railway freight rates can be divided into general freight rates, special freight rates and military freight rates [11].

In China, the operating price of railway goods can be divided into three categories according to the handling category of goods, which are the freight rate of whole vehicle goods, the freight rate of less-than-cargoes goods and the freight rate of container goods, among which the freight rate of whole vehicle goods includes the freight rate of refrigerated vehicles. According to the different types of goods handled by different forms of operating prices, it is necessary to select the corresponding tariff number to determine specific tariff standards. What our country executes at present is base price 1 (send base price) with base price 2 (run base price) two kinds of forms.

According to the cargo handling category, the calculation formula of cargo transportation costs is as follows:

Freight of whole vehicle goods = (base price 1+ base price 2× freight kilometers of goods) × weight charged

Freight of less-than-carload goods = (base price 1+ base price 2× freight kilometers) × billing weight /10kg

Container freight = (base price 1+ base price 2× freight kilometers) Railway construction fund× number of charged boxes

(2) Railway construction fund

China's railway construction fund has been collected since 1991, mainly used to ensure the railway
construction and development, and is an important part of the uniform freight rate of railway goods. Railway construction funds will be collected from formal operating lines and some temporary operating lines according to the categories and types of goods. Among them, the calculation formula of railway construction fund is as follows:

\[
\text{Railway construction fund} = \text{rate} \times \text{billable weight (number of boxes/axle)} \times \text{freight mileage}
\]

3.1.2. Electricity surcharge. With the rapid development of China's economy, road network facilities have been constantly improved, the emergence of electric locomotives in railway transport. Electric locomotive is widely used in railway transportation because of its strong overload capacity, fast speed, short reconditioning time and large power. However, a large amount of electric energy is needed to maintain the normal operation of electric locomotives. Therefore, the state price bureau issued the document no. 126 [1993] in 1993, and decided to add electricity surcharge according to the standard of 0.0040 yuan / (T \cdot km) for the whole load of electric locomotives in railway freight from April 15. Other goods shall be converted according to the standard of complete vehicle. According to the change of electricity price, the cost can be adjusted, and the price department of the state council shall approve it once every two years. The electricity surcharge of railway freight vehicles in China is maintained at 0.0120 yuan / (T \cdot km) at the present stage. Calculation formula of electricity surcharge:

\[
\text{Electricity surcharge} = \text{rate} \times \text{billing weight (number of boxes/number of shafts)} \times \text{ electrified mileage}
\]

3.1.3. Miscellaneous fees. Miscellaneous expenses refer to the auxiliary operations and labor services provided by railway transport enterprises to shippers and consignees during the whole process from the promised transportation of railway transport goods to the delivery of goods, as well as the extra expenses incurred by shippers or consignees for occupying railway equipment, appliances and spare goods [12]. Miscellaneous fees are charged according to the standards stipulated in document no. 54 [2013] issued by the railway corporation in 2013.

3.1.4. Extension service fee. In order to standardize the relationship between some railway operators and railway transport enterprises, and reduce or even avoid the situation of compulsory service, compulsory charge and higher charge standard of railway transport enterprises, on November 17, 1997, the former State Planning Commission and the former ministry of railways jointly issued the "measures for the management of railway goods transport extended service charge". It is pointed out in the document that the extended service charge of railway freight transport refers to the fee charged by the railway freight transport extension service operator to the shipper or consignee in order to compensate for the consumption of various services provided, including the cost of providing labor service, site and facilities [13].

3.2. Freight form
After many adjustments, the railway freight price in China shows that the single pricing form is difficult to meet the current complex changes in the railway freight market demand. As a result, the state and Ministry of Railways of the People's Republic of China (China State Railway Group Co., Ltd.) have developed a variety of railway freight rates to meet the changing market demand. Railway freight rates mainly include the following types: basic freight rate, new road freight rate, special cost compensation freight rate, special regional freight rate and floating freight rate [14].

- Basic freight rate. Basic freight rate is directly designated by the state, also known as uniform freight rate, is the main form of railway freight rate. It is applicable to any area of the country, implementing different freight rates according to the transportation distance and type of goods, and is most widely used in railway freight rates.
- New roads, new prices. It is a supplement to the basic tariff form. It is to point to on the basis of basic freight rate, to undertake double line or electrification to transform the railroad line and new railroad line carry out grade to change price.
- Special cost compensation freight rate. It is also a supplement to the basic freight rate, which
increases the cost through electricity surcharge collection and electricity price increase. The appearance of this kind of freight rate marks the beginning of the link between railway freight rate and price.

- Special regional freight rates. Also known as special freight rate, according to the national policy on transportation prices, the special freight rate is set for goods transported in specific areas and routes, or for goods that need to be handled according to fixed transportation conditions. Special regional freight rates are generally based on the uniform freight rate, which can be increased or reduced.

- Floating freight rates. It refers to the transportation price that fluctuates to different degrees within the scope of national price policy according to market supply and demand. The floating price improves the operation effect of railway transport enterprises and alleviates the seasonal transport problem of railway goods.

3.3. Freight calculation

At present, freight rates of China's railway freight are formulated in accordance with railway freight rules and related accessories. Different categories of goods correspond to different freight Numbers, freight rates and freight calculation methods. The calculation process of railway freight is as follows:

- According to the "freight rate odometer" calculate the freight miles from the starting station to the terminal.
- According to the name of the goods filled in the bill of lading, look up the corresponding categories of goods in the list of goods name and code of railway goods transportation and the list of goods name inspection of railway goods transportation, and determine the corresponding freight number.
- According to their corresponding freight number, container goods according to the type of container, refrigerated goods according to the type of vehicle, through the "railway freight rate table" to find the corresponding base price and operating base price.
- Determine the billing weight of the goods (the number of containers), calculate the freight and operation freight according to the freight calculation formula.
- Calculate miscellaneous freight and other expenses in accordance with relevant regulations.
- The sum of all the above costs is the freight of railway goods.

4. Problems existing in China's current railway freight pricing system

Since the establishment of new China, China's railway freight has undergone many reforms and the freight rate system has been gradually improved. Although the development of railway freight has been promoted to some extent, there are still many problems to be solved in the market-oriented economic system.

4.1. It is difficult to adapt to the requirements of competition in the transportation market

In the current market economy environment, the rise of other modes of transportation has brought great pressure of substitution to the railway industry. Other modes of transport can provide the same quality of transport services as railway transport, leading to the gradual replacement of the traditional advantages of railway transport. Consumers can choose more modes of transportation according to their own preferences and needs, rather than relying solely on railway transportation. Although railway transport enterprises can respond to the market by changing the transport price of some goods, it cannot completely solve the passive position of railway enterprises in the market competition. Therefore, China's current freight rate mechanism is still difficult to adapt to the requirements of transportation market competition.

4.2. The freight rate is low, low social investment heat

Under certain risk conditions, investors in the society will pursue the shortest possible recovery cycle and the highest possible rate of return. Transportation price and volume are directly related to the profit and loss of railway transportation enterprises. Comparatively speaking, the impact effect of transportation price is greater than volume. However, the freight rate of railway goods in China is still at a low level, which cannot bring high expected profits to the investors. Therefore, the relatively low
return on investment and relatively long recovery period of railway transport industry at the present stage lead to the reluctance of social investors to invest capital in railway transport enterprises.

4.3. The price comparison relationship is unreasonable

The comparison relation of railway freight includes internal comparison relation and external comparison relation. The internal price comparison relations are divided into the freight rate comparison relations between railway freight modes and the freight rate comparison relations within the freight modes. The external price comparison relation is the price comparison relation between the freight level of railway goods and social commodities. It can be seen from the analysis of the internal and external price comparison relations that the price of commodities increases simultaneously with the increase of freight rates of various modes of goods transportation, among which the increase range of railway freight rates is relatively small. In this case, however, rail freight turnover is still smaller than other modes of transport, especially road transport. Therefore, the current price comparison relationship in China is unreasonable.

4.4. It is difficult to reflect the supply and demand relationship of railway freight market

The imbalance of regional economic development in China directly determines the difference of supply and demand between railway freight regions and routes, which leads to the difference in the value of railway freight transport. According to economic theory, one of the factors affecting the price of a product is the relationship between supply and demand in the market, and the price of a product fluctuates according to its value. Therefore, only when the freight price of railway goods can truly reflect the relationship between market supply and demand, can the freight price play a leverage role in regulating market supply and demand, so as to better guide the allocation of market resources. However, the Chinese government is concerned that if freight rates are deregulated, railway transport enterprises may expand their control over the freight market by using their unique network resources, resulting in a dominant situation and disrupting the entire transport market. Therefore, China's railway freight rate has been kept at a low level for a long time. In this case, the freight rate formed lacks leverage, and it is difficult to reflect the real relationship between supply and demand in the transport market.

5. Conclusion

The railway freight pricing system is an important basis for the railway head office to adjust the freight organization and operation plan. Through the staged analysis of China's railway freight rate management mechanism, the four stages that the freight rate management mechanism has experienced since the early stage of the founding of the country and the reform process of pricing methods are presented. Explain the freight rate structure, freight rate form and freight calculation in the current pricing system. Analysis of the shortcomings of the current pricing system of railway freight transportation can provide an appropriate direction for the future reform of railway freight transport organization and provide market competitiveness of railway freight transport.

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