

# The evolution and development of railway passenger transportation clearing method in China

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Yin Zhou  
*Transportation and Economics Research Institute,  
China Academy of Railway Sciences Corporation Limited, Beijing, China*

Wei Fang and Yan Xu  
*Passenger Transport Department, China State Railway Group Co., Ltd.,  
Beijing, China, and*

Huaxiang Wang and Lu Liu  
*Transportation and Economics Research Institute,  
China Academy of Railway Sciences Corporation Limited, Beijing, China*

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## Abstract

**Purpose** – As an important part of the management of railway passenger transport, the rationality and effectiveness of the clearing method of railway passenger transport are directly related to the operating efficiency and service quality of railway passenger transport enterprises. This paper aims to comprehensively and deeply discuss the evolution and development process of China's railway passenger transport clearing method, analyze its characteristics and influences in each stage, identify the main factors affecting its evolution and development and then put forward thoughts on improving the future development of the clearing method.

**Design/methodology/approach** – Through a detailed review of the railway passenger transport clearing methods from the planned economy period to the reform and opening up period and into the new century, the basis, mode, subject and object of clearing in different development stages are systematically compared.

**Findings** – It comprehensively reveals the evolution of the clearing method, sorted out the characteristics and changes of the clearing method at each stage and the adaptability to the development of railway passenger transport at that time. The characteristics of the development of clearing measures for railway passenger transport in different stages and their far-reaching influence on railway passenger transport business are deeply analyzed.

**Originality/value** – This paper summarized the factors influencing the development of China's railway passenger transportation clearing approach evolution, including the simplified rules of clearing, enhanced the market adaptability, establishing and perfecting the incentive mechanism, strengthening the construction of informatization, etc. This paper puts forward the ways to improve the railway passenger transportation clearing future development thinking.

**Keywords** Railway transport, Railway passenger transport business, Carrier system, Clearing method, Evolution and development

**Paper type** Research paper

## 1. Introduction

As a country with a powerful, comprehensive transportation system featured by railways as its backbone, the railway carries the important mission of promoting economic development and serving people's livelihood. As the key institutional support in the field of railway passenger transport, the clearing method of passenger transport plays a vital role in the economic operation and development of railway transport enterprises. Its science, rationality and

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adaptability are directly related to the sustainable development of the railway industry and the efficient operation of the national comprehensive transportation system. With the continuous development of China's economy and the continuous reform of the transportation system, the method of railway passenger transport clearing is also constantly evolving and developing. From the simple model in the early days to the increasingly complex and complete system today, each change reflects the needs of The Times and the development of the railway industry (Huang *et al.*, 2019). An in-depth study of the evolution and development of China's railway passenger transport clearing method will not only help us better understand the historical changes of the railway passenger transport industry, but also provide useful reference and guidance for the sustainable development of railway passenger transport in the future, and lay a solid foundation for further improving the comprehensive competitiveness and service level of China's railway passenger transport.

## 2. The evolution of the railway passenger transport clearing method in China

### 2.1 *The clearing method in the planned economy period (1949–1979)*

From the early days of the founding of the People's Republic of China to before the reform and opening up, it was a period of practical exploration for the railway transport revenue clearing method to develop from scratch and gradually take shape. During this period, the clearing method underwent three stages of change.

#### (1) Intradepartmental Retention and Through Allocation (1949–1958)

During this stage, all railway passenger transport revenues were turned over to the former Ministry of Railways. Among them, the intradepartmental transport revenues were not allocated among the railway administrations and directly served as the due transport revenues of the receiving railway administration; for the through transport revenues, each railway administration was allocated according to the completed workload and the average revenue rate calculated through aggregation during that period. Subsequently, during the period from 1951 to 1958, the clearing method for the through part was optimized and adjusted several times. Mainly, a certain proportion was extracted from the total revenue as the originating and destination handling fees before allocating the passenger transport through revenues, and the remaining part was then allocated according to the workload completed by each administration. This improvement in the allocation method was more in line with the characteristics of railway passenger transport operations and was conducive to better motivating the enthusiasm of the originating and terminating railway transport enterprises (Zhao *et al.*, 2023).

#### (2) Average Revenue Rate (1959–1965)

Starting from January 1959, the former Ministry of Railways changed the allocation of passenger transport revenues to a unified allocation based on the average passenger-kilometer revenue rate of the whole railway. Each railway administration calculated the transport revenues it should receive according to the actual workload. Compared with the clearing method in the previous stage, the "average revenue rate" simplified the original railway transport revenue clearing method. Each railway administration could easily compare the difference between the budgeted revenue and the actual revenue, facilitating the assessment and evaluation of its business performance. However, this clearing method also had its shortcomings. That is, all the transport revenues of the railway administrations were aggregated and evenly allocated without comprehensively considering the differences in geographical location, economic location, and operating costs of each railway administration, which would lead to unfair profit distribution and an imbalance in profits among the railway administrations.

#### (3) Separation of Revenue and Expenditure (1966–1979)

In January 1966, the former Ministry of Railways introduced a new clearing method, requiring that the allocation of transport revenues be adjusted to be managed and assessed according to the principle of “separation of revenue and expenditure.” That is, the former Ministry of Railways issued annual transport revenue plans and expenditure plans and assessed the revenue and expenditure work of the railway administrations according to the plans respectively. This method was a product of the planned economy era. Under the management system of mandatory planning implemented by the state, it not only significantly reduced the workload of calculating transport revenue clearing, played a positive role in strengthening revenue management, centralized fund allocation, and overall railway distribution, but also weakened the unfair distribution among the railway administrations caused by the clearing based on the average revenue rate and could, to a certain extent, mobilize the enthusiasm of the railway administrations to organize revenues.

### *2.2 The clearing method after the reform and opening up (1980–2004)*

After the reform and opening up, China’s railway began to explore institutional reforms. In terms of passenger transport clearing, market principles were introduced for the first time. During this period, the clearing method underwent six stages of change.

#### (1) Clearing Unit Price (1980–1986)

Starting from January 1980, considering that the economic regions and network locations of each railway transport enterprise were different, as well as the differences in transport costs and transport efficiencies caused by natural geographical conditions and technical equipment conditions, the former Ministry of Railways implemented a transport revenue clearing method of “clearing unit price” across the railway. That is, the 20 railway administrations across the railway were divided and 12 kinds of clearing unit prices were formulated. Each railway administration calculated and obtained transport revenues based on the actual completed workload and these 12 kinds of clearing unit prices. In 1983, under the wave of replacing profit delivery with tax payment in the country, the former Ministry of Railways adjusted the original 12 kinds of clearing unit prices to one price for each administration and changed the calculation method of passenger transport clearing revenues to clearing based on the actual completed passenger turnover of each railway administration. Subsequently, in 1986, the “clearing unit price” method was adjusted again, adding the policy of “overproduction premium” and the proportion of “excess revenue sharing” and implementing the “economic contract responsibility system” (Liu *et al.*, 2023).

#### (2) Double Linkage (1987–1992)

In 1987, on the basis of the “clearing unit price,” the former Ministry of Railways added a clearing method of “double linkage” of “clearing unit price, revenue sharing, more overproduction, more gain, and adjustment and balance.” That is, the clearing revenues of each railway administration were linked not only with the actually completed converted turnover to reasonably compensate for transport costs and encourage overproduction but also directly with the transport revenues to promote revenue increase. This clearing method was optimized on the basis of the “clearing unit price.” While ensuring that the transport revenues of each railway administration could objectively reflect the actual costs, it also encouraged the railway administrations to achieve excess revenues, effectively mobilizing the enthusiasm of each railway administration to invest in transport production, improving the economic benefits of each railway administration, and making the distribution of transport revenues among the administrations more fair and reasonable.

#### (3) Multiple Systems in One Railway (1993)

At the beginning of 1993, the revenue clearing method of the railway transport enterprises across the railway formed a situation of “multiple systems in one railway.” That is, each

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railway administration implemented different clearing systems, including clearing methods such as “double linkage,” “current revenue offsetting current expenditure,” and “intradepartmental retention, through clearing.” At the same time, the former Ministry of Railways explained the clearing method of “current revenue offsetting current expenditure.” That is, the scope of economic contracting was expanded to include the part of contracted investment. Specifically, the transport revenues after covering transport expenditures were regarded as the profits of the railway administration, and then the profits were offset against the construction investment funds that should be paid by the former Ministry of Railways. When the former Ministry of Railways cleared the transport revenues, each railway administration only needed to turn over the transport revenues after offsetting the construction investment funds to the former Ministry of Railways.

#### (4) Intradepartmental Retention, Through Clearing (1994–1998)

In 1994, the former Ministry of Railways implemented a passenger transport revenue distribution method of “intradepartmental retention, through clearing” across the railway. This method included a complete transport revenue distribution plan (referred to as the “management - through plan”) consisting of four mutually complementary and restrictive links: “revenue clearing, cost management, profit and tax distribution, and fund transfer.” Among them, to adjust the imbalance among the railway administrations and pay for the centralized expenditures borne by the former Ministry of Railways, “regulatory revenue” was added. That is, each railway administration was required to turn over funds to the former Ministry of Railways according to a certain proportion of the “management - through revenue.” Subsequently, in 1996, the former Ministry of Railways revised the “management - through plan” and added a “coefficient adjustment” link. That is, the transport clearing revenues of each railway administration were calculated by multiplying the clearing revenue base of each administration by the corresponding revenue adjustment coefficient, fully considering the unbalanced development among the railway administrations and making the clearing method more fair and reasonable (Liu *et al.*, 2023).

#### (5) Simulated Regional Tariff (1999–2000)

In 1999, in line with the implementation of the asset management responsibility system of transport enterprises, a new transport revenue clearing method was implemented, which was specifically summarized as “simulated regional tariff, intradepartmental current revenue clearing, through operation clearing, and service mutual compensation.” This method was actually an improvement of the “management - through plan.” For the first time, market factors were considered in the transport revenue clearing method, and at the same time, the situation of mutual service provision among the railway administrations was also considered, balancing the interests of complementary operation links among the administrations, facilitating the unified command of the transport production process and the unified scheduling of transport production equipment, and providing favorable conditions for the efficient utilization of assets.

#### (6) Passenger Transport Revenue from the Market (2001–2004)

At the beginning of the 21st century, the railway transport revenue clearing method further played the main role of the market, making the clearing mechanism of passenger transport revenues more market - oriented. Specifically, during the period from 2001 to 2004, the railway transport enterprises implemented a transport revenue clearing method of “passenger transport revenue from the market, separate accounting for passenger and freight networks.” That is, passenger transport revenues came from the market, freight revenues were cleared together with the railway network, and mutual clearing was carried out for service provision. Among them, the overall idea of passenger transport revenue clearing was to directly obtain revenues from the market. In principle, all passenger transport revenues directly related to the

operation of passenger trains were regarded as the passenger transport business revenues of the train - operating administration, and the remaining passenger transport revenues were regarded as the passenger transport business revenues of the receiving administration; for mutual clearing of service provision, according to the principle of separate accounting, all related services between different transport entities and between the passenger and freight transport of the same entity were defined as related services, and all related services had to be cleared.

### *2.3 The clearing method in the carrier system mode (2005 – present)*

Since 2005, the former Ministry of Railways promulgated the “Railway Transport Revenue Clearing Method,” stipulating that railway passenger transport should implement carrier settlement and mutual clearing for service provision. This method has been in use ever since. In the past decade or so, the railway passenger transport clearing method has been mainly based on this, and new document systems and methods have been continuously introduced around the upgrading of railway technical equipment, the diversification of transport products, the expansion of infrastructure construction scale, and the requirements of deepening the legalization and marketization reform of the railway industry. Appropriate supplements, adjustments, and revisions have been made to matters such as line categories, clearing unit prices, and clearing items, and the passenger transport clearing method has been continuously optimized and improved in practice to further adapt to the actual changes in transport organization adjustment, network scale expansion, train speed increase, and other transport production. Specifically:

In 2007, in combination with the successful implementation of the sixth large - scale speed increase and diagram adjustment of the railway, the former Ministry of Railways improved the technical standards of some lines and increased the number of high - speed EMU trains. To adapt to these changes, since then, the corresponding line categories and clearing standards of high - speed railways have been continuously revised and improved, with the goals of improving the operation quality and efficiency of EMU trains, promoting the increase in transport revenues of transport enterprises, and improving the reasonable compensation input mechanism. These include: adding special line categories for line usage fees and adding especially busy line categories for special line categories; proposing to give certain discounts on the line usage fees and catenary usage fees (excluding electricity charges) of EMU trains with sleeping cars and EMU trains running on special line categories during the nighttime idle period (from 22:00 to 6:00 the next day); dividing the station passenger service fees of high - speed EMU trains into busy and non - busy passenger stations. Subsequently, in 2017, to promote the full utilization of the capacity of high - speed railway lines and make the railway administrations and joint - venture railway companies have the same goal, share rights and responsibilities, share benefits, and cooperate for a win - win situation, the former China Railway Corporation added a clearing item for high - speed railway transport capacity guarantee fees. In 2020, due to the relatively high average construction cost of special - structure sections of high - speed railways and the complexity of their special structures, natural environments, and operating conditions, to reflect the difference in construction costs, make up for the operation and maintenance costs, and ensure the operation safety needs, a clearing item for the operation safety guarantee fees for the inspection and monitoring of special - structure bridges and tunnels was added. In 2023, to implement the requirements of market - oriented and legalized operation, the railway for the first time proposed and established a negotiation mechanism for the passenger transport clearing unit price of railway transport enterprises, aiming to bind the interests of the train - operating enterprise and the service - providing enterprise together, maximize the enthusiasm of both sides to increase transport revenues, and jointly expand the market share of railway transport.

### 3. Characteristics and influences of the development of the railway passenger transport clearing method in different stages

#### 3.1 *The planned economy stage*

##### (1) Characteristics

Firstly, the clearing method was continuously optimized and adjusted. From intradepartmental retention and through allocation, to the average revenue rate, and then to the separation of revenue and expenditure, it continuously adapted to the development needs of the railway transport in different periods. For example, the extraction of originating and destination handling fees in the later stage of through allocation was more in line with the characteristics of railway passenger transport operations and was conducive to motivating the originating and terminating transport enterprises. Secondly, the clearing method was gradually simplified. The average revenue rate simplified the original railway transport revenue clearing method, making it convenient for the railway administrations to compare the difference between the budgeted revenue and the actual revenue and thus assess the transport performance. Thirdly, it was obviously restricted by the planned economy. Although the separation of revenue and expenditure had a positive effect in a specific period, as a product of the planned economy era, it formed a “big - pot - rice” system in the later stage. The railway administrations became reimbursement units and no longer carried out economic accounting. Revenue and expenditure were not linked, profits were not assessed, and profits and losses were not counted, which was not conducive to stimulating the enthusiasm of the railway administrations.

##### (2) Influences

Overall, the clearing methods in each stage played a certain promoting role in different periods. Among them, the through allocation method motivated the enthusiasm of the originating and terminating transport enterprises and promoted the development of the railway transport business in specific links; the average revenue rate facilitated the assessment of transport performance and provided certain convenience for railway transport management; the separation of revenue and expenditure played a positive role in strengthening revenue management, centralized fund allocation, and overall railway distribution. However, due to the limitations of the clearing method, the profits of some railway administrations were unbalanced, weakening their development momentum. In addition, the “big - pot - rice” system hindered the economic accounting and enterprising spirit of the railway transport enterprises and was even more unfavorable for the long - term development of the railway passenger transport business (Li, 2019).

#### 3.2 *The stage after the reform and opening up*

##### (1) Characteristics

Firstly, multiple factors were comprehensively considered. For example, the clearing unit price considered the differences in costs and transport efficiencies such as the economic regions, network locations, and natural geography of each railway administration; the intradepartmental retention and through clearing considered adjusting the imbalance among the railway administrations; the simulated regional tariff considered the unit transport cost and market factors (Gong, Ren, Liu, & Yan, 2022). Secondly, the enthusiasm of enterprises was stimulated. Measures such as double linkage, overproduction premium, and excess revenue sharing, to a certain extent, encouraged each railway administration to overproduce and increase revenues and improve economic benefits. Thirdly, the role of the market was strengthened. The passenger transport revenue from the market made the clearing of passenger transport revenues closer to the market demand and played the main role of the market. Fourthly, the management difficulty increased. Methods such as multiple systems in one

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railway made the clearing system more complex. Different railway administrations implemented different systems, increasing the difficulty of coordination and management and also increasing the complexity of accounting.

## (2) Influences

Overall, it promoted the development of the railway transport enterprises. The adjustments of various clearing methods prompted the railway administrations to pay more attention to cost control, improve transport efficiency, and increase transport revenues, enhancing the economic benefits and competitiveness of the railway transport enterprises and increasing the degree of marketization. Making the passenger transport revenue in line with the market promoted the railway passenger transport enterprises to improve service quality to attract more passengers. Moreover, the addition of coefficient adjustment took into account the actual situations of different railway administrations, making the distribution of transport revenues among the administrations more fair and reasonable. However, due to the frequent adjustments and increasing complexity of the clearing method, it also increased the communication and coordination costs among the transport enterprises, increased the management difficulty, was prone to management loopholes and non - standard operations, and would lead to difficulties for the railway administrations in formulating stable development plans in the short term, affecting the long - term investment and development confidence of the enterprises (Liu, Lv, & Song, 2019).

### 3.3 The carrier system mode stage

#### (1) Characteristics

Firstly, it continuously adapts to market demands. Emphasizing that revenues come from the market and establishing a negotiation mechanism for the passenger transport clearing unit price, enhancing the market characteristics. Secondly, it optimizes the allocation of transport capacity resources. Under the carrier system clearing mode, the role of the market mechanism can be better played, prompting resources to flow to transport enterprises with advantages, guiding the rational utilization of railway line resources, and improving the operation efficiency and resource utilization efficiency of the entire railway passenger transport network. Thirdly, the clearing classification is scientifically refined. The clearing method is continuously adjusted according to the actual changes in transport, such as refining indicators to adapt to changes such as the upgrading of technical equipment, and making detailed classifications of line categories and train fare grades to improve the accuracy of clearing. Fourthly, it may lead to local interest conflicts. In the process of pursuing the carrier volume and clearing revenues, there may be excessive competition among different railway transport enterprises. Fifthly, the coordination difficulty increases. Since each enterprise pays more attention to its own carrier volume and clearing revenues, the coordination difficulty will increase when it comes to cross - enterprise transport arrangements and line adjustments.

#### (2) Influences

Under the carrier system clearing mode, the revenues of transport enterprises are directly linked to the carrier volume, which promotes transport enterprises to improve service quality and carrier efficiency, adapt to the high - speed rail era and diversified market demands, achieve sustainable development, and jointly expand the railway market share. However, since the passenger transport clearing methods are relatively scattered, scattered in different documents since 2005, and some rules still follow the regulations of the former Ministry of Railways reform, which do not conform to the current situation and requirements of market - oriented reform. At the same time, some clauses of some documents are no longer valid. But because they are not integrated together, it is easy to cause ambiguity for newly joined

enterprises, which is not conducive to the standardized management and overall coordinated development of the industry.

#### **4. The influencing factors of the evolution and development of the railway passenger transport clearing method in China**

The evolution and development of the railway passenger transport clearing method in China are affected by multiple factors, mainly manifested in three aspects: changes in macroeconomic policies, changes in transport market demands, and technological progress.

##### **(1) Changes in Macroeconomic Policies**

The aspects related to the railway industry in the changes of macroeconomic policies include railway construction investment, railway system reform, and railway transport services. Among them, the railway system reform plays a crucial role in promoting the passenger transport clearing method (Shi, 2019). From the mandatory management in the planned economy period, such as the “separation of revenue and expenditure” method, to a series of reform measures after the reform and opening up, it reflects the transformation of the system from being highly centralized to attaching more importance to the market mechanism. With the implementation of system reforms such as the asset management responsibility system of railway transport enterprises, the clearing method is continuously adjusted to adapt to the new management requirements. For example, the introduction of the “simulated regional tariff” method is to balance the interests of each railway administration and enhance the enthusiasm and competitiveness of railway transport enterprises under the background of system reform.

##### **(2) Changes in Transport Market Demands**

The changes in market demands are an important guiding factor for the evolution of the clearing method. With the development of the economy and the diversification of people’s travel demands, railway passenger transport is facing increasingly fierce market competition. In order to better meet the market demands, the clearing method is constantly adjusted to improve the degree of marketization. Such as “passenger transport revenue coming from the market, separate accounting for passenger and freight networks” and the establishment of a negotiation mechanism for the passenger transport clearing unit price, which makes the passenger transport revenue in line with the market, encourages railway enterprises to improve service quality, attracts more passengers, and adapts to the constantly changing transport market demands (Bulková, Čamaj, Černá, & Pálková, 2024).

##### **(3) Technological Progress**

Technological progress has had a profound impact on the railway passenger transport clearing method. Technological progress factors such as the upgrading of railway technical equipment, the increase in train speed, the diversification of transport products, and the expansion of the railway network scale have prompted the continuous optimization of the clearing method. For example, the emergence of high - speed EMU trains and the completion and commissioning of high - speed railways have triggered multiple adjustments to line categories, clearing unit prices, and clearing items. To adapt to lines with different technical standards and diversified transport products, the clearing method needs to be classified more precisely and scientifically to improve the accuracy and scientific nature of clearing and better reflect the cost and revenue changes brought about by technological progress.

#### **5. Thoughts on the future development of the railway passenger transport clearing method in China**

##### **(1) Simplify the Clearing Rules and Improve Operability**

The simplification of the future railway passenger transport clearing method is of great importance. The existing rules should be comprehensively sorted out, and complex indicators that are repetitive, ambiguous, or have a low correlation with the actual business should be removed. When designing the clearing rules, the principle of simplicity and clarity should be adhered to, highlighting the key elements and reducing unnecessary calculation levels and cumbersome methods (Sun *et al.*, 2023).

#### (2) Enhance Market Adaptability and Improve the Flexibility of Clearing

The price adjustment mechanism refers to the economic operation mechanism that regulates the supply and demand of goods and production factors through price increases and decreases, guiding production, operation, and consumption. Appropriate price adjustments can coordinate the reasonable formation and smooth operation of prices, achieve efficient price operation, and optimize resource allocation (Ma & Wang, 2015). For the railway transport industry, the formulation and adjustment of the clearing unit price affect the economic interests of each operating entity participating in interconnection and interoperability. The change in the clearing price will cause the redistribution and combination of economic interests among different operating entities. A dynamic clearing price adjustment mechanism is more conducive to attracting investors. With the continuous acceleration of the railway market-oriented reform, clearing, as an important business in railway transport, should also adapt to the railway reform and make corresponding adjustments. Formulating a market-demand-oriented dynamic adjustment mechanism is an important link in attracting diversified social capital into the railway (Li & Zhang, 2003).

#### (3) Establish and Improve the Incentive Mechanism to Promote the Development of Transport Enterprises

Improving the incentive mechanism in the railway passenger transport clearing method is an important means to promote the development of enterprises. For enterprises with good operating benefits and high service quality, various rewards should be given, while for enterprises with poor management and low service quality, corresponding punishment measures should be taken. Through the incentive mechanism, railway transport enterprises are guided to continuously improve their operation and management levels and service quality, prompting transport enterprises to strengthen cost control, optimize resource allocation, and improve transport efficiency (Gao, Wei, & Hua, 2014). At the same time, attention should be paid to improving service quality, starting from the needs of passengers, improving the riding environment, and enhancing service quality to enhance market competitiveness (Shan, Lv, Wu, Zhao, & Zhang, 2024).

#### (4) Strengthen Information Construction and Improve Data Quality and Processing Efficiency

In the era of rapid development of information technology, railway passenger transport clearing must keep up with the pace. On the one hand, the Internet of Things technology is used to realize the automatic collection of data. Through big data processing technology and artificial intelligence algorithms, the efficient processing and transmission of data are realized, and the automatic classification, summarization, and analysis of data are carried out to provide a solid data foundation for the clearing work (Liu, Yi, Shen, & Wang, 2022). On the other hand, the accuracy, integrity, and timeliness of data should be improved. A strict data quality control mechanism should be established, and the collected data should be subject to multiple verification and review to ensure the authenticity and reliability of the data. At the same time, the cost and difficulty of data collection and processing should be reduced, and the work efficiency should be improved by reducing manual intervention through automated processes.

## 6. Conclusion

The railway passenger transport clearing method in China has experienced a long evolutionary process from the planned economy period to the market economy period and has played an important role in different stages. With the continuous deepening of China's railway system reform and the changes in the transport market, the railway passenger transport clearing method is also constantly being optimized and improved. Currently, there are still some problems with the railway passenger transport clearing method in China, and improvements are needed in aspects such as further simplifying the rules, strengthening information construction, establishing and improving the incentive mechanism, and enhancing market adaptability (Tabares, Parida, & Visnjic, 2023). In the future, the railway passenger transport clearing method in China will develop in a more scientific, reasonable, and efficient direction, providing a strong guarantee for the sustainable development of China's railway passenger transport.

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**Corresponding author**

Huaixiang Wang can be contacted at: [wanghuaixiang@sohu.com](mailto:wanghuaixiang@sohu.com)