



## Improvement of the Economic Management System Based on the Publicity of Railway Transportation Products

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### ABSTRACT

The traditional view is that due to the natural monopoly and external publicity of the railway transportation, the economic regulation should have been implemented. However, due to the inaccurate grasp of the technical and economic characteristics of various components in the system and the current social and economic situation in China, the economic regulation has been implemented for a long time. Based on a detailed analysis of the characteristics of the railway transportation infrastructure and the market characteristics of the road transportation products, combined with China's actual national conditions, the economic regulation schemes for each market segment have been proposed from the aspects of the entry regulation and price regulation, in order to promote the railway transportation in China. This paper proposes the improvement of the economic management system based on the publicity of the railway transportation products. Overall, the development of the country is inseparable from the road transportation. The railway transportation is the lifeblood of the country's economic development, closely related to the country's economic development, along with science and technology. With progress, the road transport has gradually covered all areas, and the coverage is very wide. In other words, only when the railway transportation has achieved good development, the country's economy can develop better and develop smoothly.

**KEY WORDS:** Development, economic management, economic regulation, publicity, railway transportation.

### 1 INTRODUCTION

UNDER the background and framework of China's economic system reform, China's traffic management reform has steadily advanced. Government management functions have continuously changed, and the market's basic position in the allocation of transportation resources has further strengthened. Practice has proven that deepening the reform of the traffic management system, promoting the innovation of the transportation system, enhancing the vitality and competitiveness of the transportation market, and building a healthy and effective modern transportation system are the fundamental guarantees for promoting the sound and rapid development of the transportation industry (Elnadi, M., & Shehab, E. 2016). China's transportation system reform has three important time nodes; 1978, 1992, and 2002. Under these three nodes, one has a leap in understanding, the other shows a

major break-through in the system, and the third is a new step in the construction of the transportation infrastructure. 1978 was the first year of China's transportation system reform and the first year of China's reform (Fagnant, D. J., & Kockelman, K. 2015). 1992 was the first year of China's transportation market economy and the first year of China's market economy (Ghaderi, H et al. 2015). 2002 was the first year of China's establishment of an integrated transportation system. In this year, China formally proposed the framework for establishing an integrated transportation system. The railway transportation occupies an important leading position in the transportation market (Newstead, S et al 2015). As a popular means of transportation, railway transportation plays an important role in the transportation market. The railway transportation enterprises must constantly improve the transportation mode, improve customer choice, change the way of value acquisition, change strategic control, expand

business scope, and maintain market competitiveness (González-Gil, et al 2014).

Since the implementation of the traffic reform, we have solved many major cognitive problems. In summary, we mainly understand two points; first, what role does transportation play in the national economy, and second, what kind of development mode should have been adopted for transportation (Jakhar, S. K. 2015). The understanding of these two points are actually and constantly improving and deepening in the context China's economic development. It has achieved three leapfrogs in three stages. The first leap was at the Third Plenary Session of the Eleventh Central Committee (Jeevan, J., Chen, S. L., & Cahoon, S. 2018). The Party Central Committee decided to transfer the work centre from the class struggle to the economic construction and implement a planned commodity economy. The coastal areas took the lead in the development and encouraged the whole society to develop the transportation, but the way was extensive, mainly to solve the problem. At this stage, because people's thoughts are long-term imprisoned, the process of understanding is relatively lengthly, and the requirements are relatively low. The second leap began with the 1992 Deng Xiaoping speech. Since then, China has begun to implement a socialist market economy (Khaliq, K. A., Qayyum, A., & Pannek, J. 2016). The transportation sector believes that transportation is the basic industry of the national economy and must have prioritized (Laroche, F et al 2017). The mode of traffic development began to focus on network construction, emphasizing investment efficiency, and proposing the establishment of an integrated transportation network, but there is a great controversy over the construction of the high-quality transportation infrastructure. The understanding of this stage has been more systematic, the reason is also more profound, and the requirements are higher (Mercier, S et al 2017). In 2002, the central government explicitly requested to improve the socialist market economy system. Under this background, the people realized that the transportation has a leading role in the national economy, to accelerate development, and to improve the comprehensive transportation system. The transportation development mode aims at building an integrated transportation system, paying more attention to planning and post-construction. The construction focuses on the optimal allocation and connection of resources in various ways, pays attention to regional balanced development, pays attention to comprehensive transportation efficiency, and achieves good and fast sustainability (Morant, A et al 2017). Thereby achieving the third leap in the understanding of transportation development, this time the understanding is also the most scientific (Oberhofer, P et al 2014).

Public good, as a term used in the Western economics, refers to non-competitive and beneficial non-exclusive products such as; national defence, education, science and technology, and culture. Non-competitive and non-exclusive features of use or consumption have generally been provided by the government or other social groups. It has been divided into pure public goods and quasi-public products in terms of type, which is commensurate with private products (Omer, A. M. 2017). The railway transportation products have collective consumption, and the consumption on a certain limit is not competitive, and at the same time has non-exclusive characteristics. Therefore, the publicity of the railway transportation products can be seen from two points. The compensation of the consumption of the railway transportation products makes it have characteristics of private products. Moreover, with the continuous deepening of the reform of the railway system, its private characteristics have become increasingly prominent, from the funding sources of railway infrastructure construction, to the gradual decentralization of independent pricing of passenger and freight transportation prices, and even to the operational mode of the entire railway transportation industry (Pan, S et al 2018). The public traces of railway transportation products consumed a little bit and the personal characteristics have gradually been revealed (Poiani, D. et al 2015). Under such a situation, how to position the publicity of the railway transportation products and to proceed to promote the reform of the transportation economic management system has become a problem that the railway transportation industry has to pay attention during the transformation process (Rietveld, L. C. et al 2016). In the current situation of such reforms, it is necessary to adhere to the public nature of the railway transportation products. At the same time, we must take into account the private characteristics of the railway transportation products, cater to the needs of market economy development, and follow the law of market economic development to achieve separation of government and enterprise, let the government return to the government, and the market to the market (Sindakis, S. et al 2015).

The specific contributions of this article include: A literature survey on the various existing economic supervision methods and the railway product propaganda management system, and analysis of their advantages and disadvantages. A perfect model of the economic management system based on the railway transportation product propaganda, performance analysis of the model and compared with other existing algorithms, the model can be prepared to grasp the social and economic conditions, establish cross-regional railway transportation enterprises, make transportation enterprises close to each other, improve railway transportation efficiency, and promote the

development of the railway transportation enterprises (Shen, W. et al 2016).

The rest of this paper is organized as follows: Section 2 discusses methodology. The designing based on the passive RFID anti-counterfeiting platform is discussed in Section 4, and Section 6 concludes the paper with summary and future research directions.

## 2 METHODOLOGY

### 2.1 *The Basic Economic Relations between the State and the Railway*

THE economic nature of the railway transportation industry has gradually changed from early full nationalization to privatization. In this transformation process, the relationship between the state and the railway should have been clarified. The power subject should have been rationally defined, and the railway transportation industry should have been smoothly over-extended (Selviaridis, K. et al 2015). First, in the investment and construction of the railway infrastructure, clarify the responsibility of national and local governments for financial support and policy support for the railway infrastructure construction. According to the different natures of construction projects, rationally divide the investment forms between central and local governments and enterprises (Silva, B. N. et al 2018). And the proportion of construction projects with obvious characteristics to publicity, such as those that are of great significance to the national defence, safeguard national unity and unite, and benefit the mountainous areas and get rid of poverty, should be led by the central or local governments and supported by the state financial support. This enhances the public character of the rail transport products (Wells, P. et al 2016). Secondly, in terms of the railway independent pricing power, the state should gradually decentralize pricing power so that the railway enterprises can make independent pricing according to factors such as the development of the market economy and the relationship between market supply and demand. At this stage, the state can decentralize the pricing power systematically, and master certain floating rights. When the time is ripe, the pricing power and floating rights have all been led by the railway enterprises (Yu, Y. et al 2016).

### 2.2 *The Characteristics of Public Goods*

The indivisibility of the public product utility refers to the public product that is usually provided to the society as a whole, it usually does not have a certain unit of measurement. The consumer consumption of public goods generally cannot choose the amount of consumption, and usually all consumers, both, consume the same amount of public goods. Samuelson's classic definition of "public goods" in the 1954 paper "Pure Theory of Fiscal

Expenditure" state public goods and private products exist; it refers to products with a common consumption nature and service. The term "common consumption" refers to the fact that public goods have been provided to members of society in a holistic sense. All members benefit from public products (Zhang, L et al 2015). The utility of public goods could not have been divided among members of society. It can only exist as a whole, and it has been called "the indivisibility of utility." The mathematical expression for a private product is:

$$X_t = \sum_{i=1}^n X_t^i; (i = 1, 2, 3, \dots, n) \quad (1)$$

In the publicity,  $X_t$  represents the utility of the private product  $t$ , and  $X_t^i$  represents the utility of the person  $i$  from the private product  $t$ . That is, the total utility ( $X_t$ ) of a commodity is equal to the sum of the utility  $X_t^i$  owned or consumed by each consumer, which means that the private product can be divided among consumers. Public goods are products with a common consumption nature, but this does not mean that when a public product is provided, all members of society can consume it and get the corresponding benefits. The extent to which members of society benefit from the provision of a specific public good and the extent of their benefits are influenced by factors such as geography and space. Most public goods and public services have their own specific areas of benefit, and there is no absolute limit of benefit.

It can be clearly seen from Figure 1 that the more publicly available products, the broader the range of benefits and the range of benefits for different public goods are different. Public goods can be divided into national public goods and local public goods according to the range of the benefits of public goods. Public goods covering all areas of the country have been called national public goods; public goods that limit the scope of benefits to a certain part of the country have been called local public goods.

### 2.3 *Characteristics of China's Railway Transportation Enterprises*

Transportation companies have the dual characteristics of materiality and public service. Its materiality emphasizes the role of transport enterprises in changing the spatial position of labour objects and changing their value and use value. Public service emphasizes the service nature of transport enterprises in social transport activities, that is, the transport industry must serve as a premise, and we want to provide transportation products for the whole society. Figure 2 shows the railway transportation route.

## Benefit range of public goods

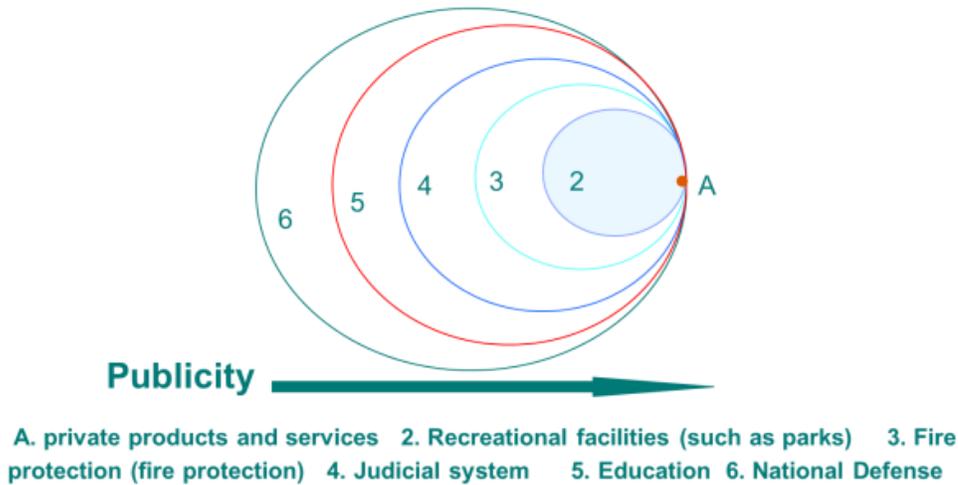


Figure 1. The Benefit Range of Public Goods.

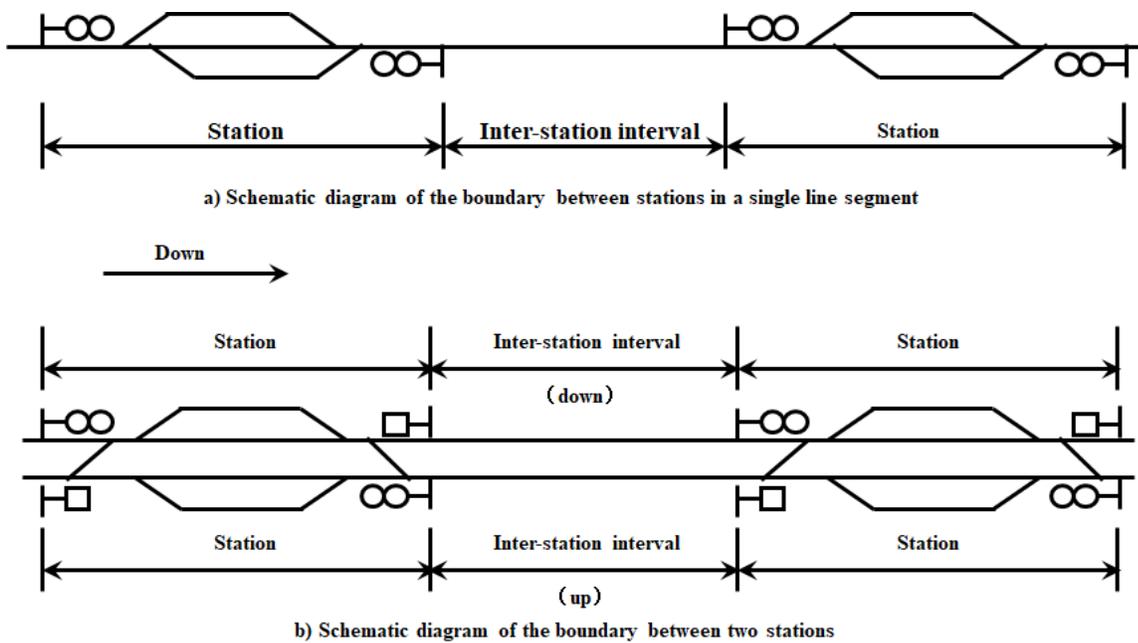


Figure 2. The Railway Transportation Route.

(1) The transportation enterprise product features

The transportation industry is a material production department that does not produce new physical form products. The transportation product refers to the spatial displacement of the transportation object, and the measurement unit is in human kilometres (passenger transportation); ton kilometres (cargo). The transportation industry participates in the production of total social products and the creation of national income but does not increase the total amount of

social products. The labour of the transportation industry is passengers and goods. Only the spatial position of the labour object is changed. Only the production right (transportation right) has no ownership; transportation is the continuation of the social production process in the circulation field; transportation production and transportation consumption are the same process. Information exchange management is the backbone of the information sharing platform, providing common data

exchange, storage and access services for information exchange and sharing between various systems. During the data exchange and sharing, the control layer of the security access performs security authentication, protocol conversion, and format identification on the access of the system. It performs content filtering on the exchanged information to ensure the legality and rationality of the data exchange. After being integrated, each application system is connected to the secure access control layer through an interface through a plugin to provide or access shared information. Figure 3 shows the public layer of the railway.

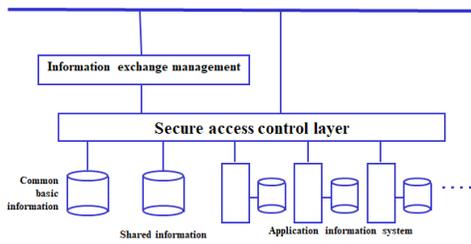


Figure 3. The Public Layer of the Railway.

(2) The status of the railway transportation in the Chinese transportation market

The railway is an important infrastructure of the country, a large artery of the country, and a popular means of transportation. It is in a backbone position in the comprehensive transportation system, and it is difficult to modernize the country without the modernization of the railway. China has a vast territory, a deep inland, a large population, unbalanced resource distribution, and industrial layout. The railway transportation has a more prominent advantage in various modes of transportation and has a particularly important position and role in the economic and social development.

### 3 CDESIGN BASED ON PASSIVE RFID ANTI-COUNTERFEITING PLATFORM

#### 3.1 System Network Structure

THE Transportation Management Information System (TMIS) is the first information system of the China Railway covering the national railway and the core system of the China Railway Informationization. The construction of the TMIS started from a project starting in 1994 and was completed on December 31, 2004. It lasted for 10 years and consist of a large-scale and complex system engineering, an important measure to realize the modernization of the railway transportation management, and a pioneering undertaking. TMIS is a national major scientific and technological research project, to include a station management information system, freight ticket system, confirmation system, freight marketing and production management system, transportation

dispatch information system, truck tracking system, container tracking system, etc., which is now called the World Railway by the World Bank. The most informative and complex management information system in the industry. The system at all levels have been interconnected by a railway communication network to form an organic whole. Its network architecture is shown below.

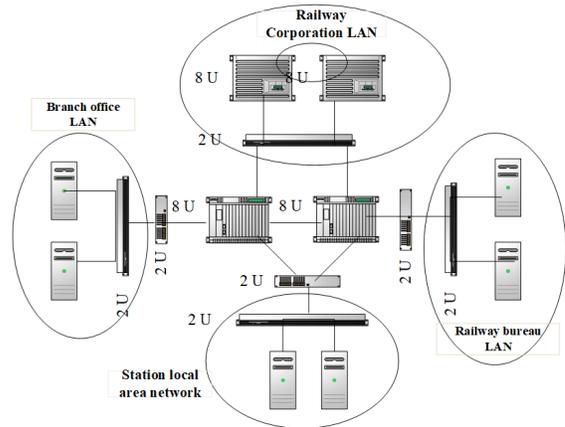


Figure 4. The Railway LAN Network Architecture of Public Goods.

The TMIS has been based on cargo transportation management. Its system application goal is to integrate computer equipment of all roads, bureaus, branches and main stations into a whole through a computer network, and collect all trains, locomotives, vehicles, containers and houses in real time. The dynamic information of the cargo transportation, real-time tracking management of trains, locomotives, vehicles and containers, realize the computer management of the ticket, confirmation, marshalling station, section station, freight station, freight marketing, and dispatching system, providing any one at any time. The technical status of a truck, a locomotive, a train, a bag collection box and the location and equipment of the goods transported, provides dynamic changes in the flow of the vehicle at any time, especially foresees changes in the flow of the marshalling stations, demarcation ports and restricted ports. The transportation managers at all levels of the national railway provide timely, accurate and complete transportation information and decision-making solutions to achieve balanced transportation, close transportation, improve transportation production efficiency and improve customer service quality. The TMIS consists of the central system of the Ministry of Railways, the railway bureau system, the railway sub-bureau system and the station-level system. The TMIS has been centred on freight management. Its functional structure is shown in Figure 5.

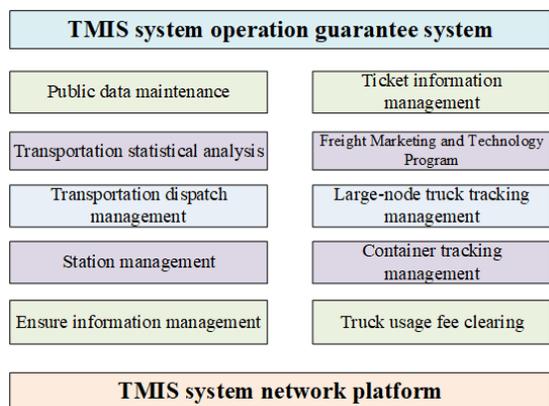


Figure 5. The Functional Structure of Railway Public Goods.

### 3.2 Environmental Construction of the Anti-counterfeiting Platform

At the beginning of the TMIS planning, the architecture centered on the central database. The system consists of five parts; the central database system, the station system, the department, the bureau, the branch office application and the computer network. The original information is directly reported to the central database system by the station segment, and each road bureau and branch office accesses various business data from the central database. Figure 6 shows the Traditional railway network map.

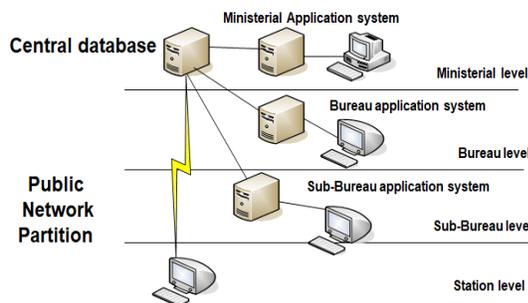


Figure 6. The Traditional Railway Network Map.

This large concentration of architecture is reasonable for the Ministry of Railways to comprehensively coordinate and optimize transportation resources and improve the efficiency of the Railways transportation production and management. However, as the application of business systems continues to deepen and the amount of data that needs to be accessed is increasing, there is a high demand for network stability, reliability, communication, and bandwidth in a large centralized architecture.

How to meet the requirements of real-time data in various aspects of production, operation, and management of various road bureaus and branch offices is a problem that the system must face. The

Ministry of Railways decided to adopt a transitional measure - the original information level 3- database construction, that is, the original TMIS design plan requires the original information to report to the central system of the Ministry of Railways by the station (segment) system, and the original information has to be reported from the station level by level., and landing and forwarding. The original information database is established in the branch office, the road bureau and the Ministry of Railways to facilitate the sharing and application of the original information by the transport organizations and various management departments at all levels. Figure 7 shows the improved railway network map.

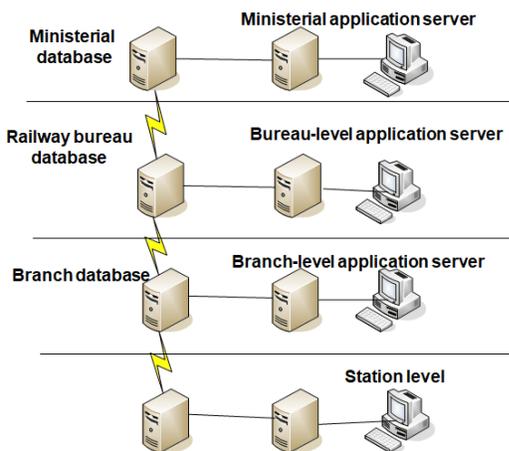


Figure 7. The Improved Railway Network Map.

The “three-level construction” is of great significance in the construction of the TMIS system. From the business point of view, the “three-level database construction” is the largest road bureau and sub-office large-scale database deployment to date, providing a good operating environment for the freight service application of the road bureau and branch office. From a technical point of view, through the "three-level database construction", it can meet the application needs of the road production and management of the road bureaus and sub-offices in terms of computing power, processing capacity and storage capacity in five years or so and the application requirements for the level decision support systems.

In a network storage, a disk array is a system that combines several hard disk drives into a whole according to certain requirements, and the entire disk array has been managed by an array controller. To speed up the interaction with the host inside the disk array, there is a certain amount of buffer memory. The host interacts with the cache of the disk array, and the cache interacts with the specific disk. In the application, some commonly used data needs to read frequently. According to the internal algorithm, the disk array finds these frequently read data and stores it in the cache to speed up the reading of the data by the

host. If there is no data in the host, the host needs to read the data, and the array reads and transfers it directly from the disk to the host. For the data written by the host, it has only been written in the cache, and the host can complete the write operation immediately. Then the cache has slowly been written to the disk. Finally, the railway transportation information sharing has been realized.

**3.3 The Railway Sector Provides Efficiency Losses for Local Public Goods**

Assume that a railway sector consists of two groups, Groups A and B, with different needs and preferences. It has assumed that the per capita cost of providing the local public goods is established, that is, the tax price for providing the local public goods is P. At this time, the number of local public products expected by residents in Area A is  $Q_a$ , and the area B is  $Q_b$ .

Under the condition that the railway department provides unified local public goods, no matter how much the preference of residents in the two regions are different, the railway department will always only provide public products with  $Q_c$  quantity. The  $Q_c$  quantity is an over-provision for residents in Area A, which makes the marginal cost of the local public goods consumed by residents in Area A greater than their marginal revenue, resulting in the loss of resource allocation efficiency of the ABC due to centralization. For residents in Area B, the number of  $Q_c$  is low. At this time, residents in Area B are still willing to pay higher marginal prices for the consumption of local public goods, which in turn will result in an efficiency loss of CDE. If provided by the local government, the local government can independently provide  $Q_a Q_b$  according to the needs and preferences of the residents in the region in Figure 8. The loss of resource allocation efficiency caused by the unified provision of public goods by the railway department can be avoided.

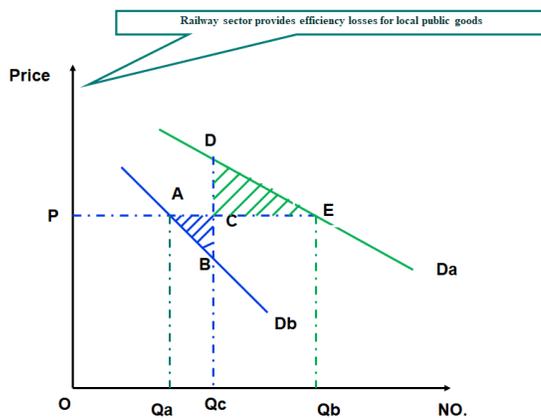


Figure 8. The Railway Sector Efficiency for Local Public Goods.

The railway department uniformly provides the difference in the efficiency of local public goods efficiency and the differences in consumer preferences among residents in various regions and the price elasticity of local public goods demand in various regions. The difference in the consumer preferences is greater among the regions, the greater the distance between  $Q_a$  and  $Q_b$  in Figure 8. The larger the area of the triangle ABC and CDE, the more the other factors are, the more uniform the railway department provides. The greater the efficiency loss caused by public goods, the smaller the welfare loss. The smaller the price elasticity of the demand for local public goods by residents in different regions, the steeper the demand curve for residents in the two regions A and B, and the area of the triangle ABC and CDE will be determined under other factors.

**3.4 Customer Terminal System Implementation**

In addition to heavy-duty transportation, China's railway cargo transportation has reached an international advanced level, and other aspects such as fast transportation, container transportation, logistics, and transportation are relatively weak. The speed of China's express products is relatively low, and the field of high-speed freight is still blank. We should actively learn from the advanced experience of foreign countries and develop diversified fast transportation products according to the customer needs to meet the service requirements of "multi-frequency, small batch, and door-to-door". Container transportation should actively develop standardized and diversified cabinets, innovative and a flexible transportation organization mode, and operate container trains. Select the logistics distribution of the centre station as the cargo transportation centre, and actively organize the establishment of intermodal transportation to improve service quality. Simplify the freight handling process, build and improve the e-commerce platform, and strengthen the cargo transportation security, to improve the level of the railway freight service in China. Figure 9 shows the test result of the public railway.

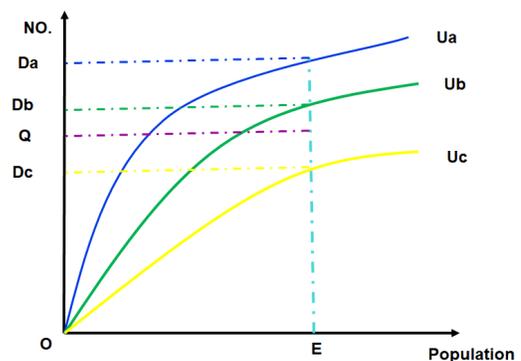


Figure 9. The Test Result of the Public Railway.

For public goods, it is possible for people to hide their true preferences and motives in the process of consumption, that is, the so-called distortion of the so-called consumption signal. The occurrence of this phenomenon has mainly been determined by the non-exclusiveness of the public goods supply and the non-competitiveness of consumption. The main resource allocation function undertaken by the local government is both a requirement of the efficiency principle and an embodiment of the efficiency principle. Of course, the railway sector is also capable of undertaking the provision of the local public goods, but the provision of the local public goods by the railway sector will inevitably lead to efficiency losses.

The role of the railway transportation is in the overall social and economic development such as.

(1) Improve regional conditions and optimize the environment

As an important factor in the regional economic development, transportation directly affects the survival and development of the transportation enterprises. With the rapid development of high-speed railways, the important conditions for passenger and cargo transportation are very attractive to various transportation enterprises. It can save transportation time and improve transportation quality, while greatly reducing transportation costs.

(2) Improve employment rates and rational use of people

In railway construction, it will provide employment opportunities for many surplus labours in towns and villages, and lead many labourers in mining, transportation and other production and processing to solve the problem of difficult employment in towns and villages. After the completion of the high-speed railway, further maintenance is needed, so that the distance between the township and the urban area can be shortened, and the export of township labour can be promoted. Therefore, the construction of the high-speed railway can directly or indirectly provide jobs for the working people in the township and raise them.

(3) Promote communication and accelerate development

The construction of a high-speed railway is inseparable from townships and towns. It not only absorbs many labourers into the city, but also urban residents come to towns and towns for investment tourism. In the invisible, advanced factors such as advanced technologies and ideas in developed regions being relatively backwards. Townships and towns, which in turn change their thinking patterns and lifestyles, have a positive impact on the development of the backward areas. The development of a high-speed railway will make the backward areas open and gradually be in contact with developed countries, thus strengthening exchanges and economic and technological cooperation.

## 4 CONCLUSION

THE railway transportation is the product of today's social activities, which promotes the development of society. With the continuous advancement of science and technology, the railway transportation as a means of transmission of information technology has also had a huge space for development. Railway transportation plays an important role in the domestic comprehensive transportation system. Establishing a perfect railway transportation network is an urgent requirement for the economic development of railway transportation. However, domestic railway transportation has been in an inefficient development for a long time. Only by examining the road transportation management from the perspective of economics can we learn from the policy improvement of the transportation industry. As far as the current situation is concerned, China's railway transportation companies are self-centred and adopt independent development methods. In this way, the internal consumption of each company is increased, there is no cohesiveness, and the company has no obvious development at all. It can only have been shackled in a small business circle and cannot resist competition from foreign markets. Based on the improvement of the economic management system and based on the publicity of the railway transportation products, it is possible to set up cross-regional railway transportation enterprises, so that the transportation enterprises have close ties, improve the efficiency of railway use, and promote the development of the railway transportation economy.

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## 6 DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

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## 8 NOTES ON CONTRIBUTORS



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