# Research on Air Transportation Problems and Construction of Integrated System

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**Yige Zhou***
**School of Journalism and Publication, Beijing Institute of Graphic Communication, Beijing, China**
***Corresponding author, e-mail: mutouzaizai@163.com**

## Abstract

*As the pillar of the logistics transportation industry, road transportation is the main method of freight transportation in China. While achieving rapid development, it also produces many unreasonable transportation phenomena. Air driving as the most common irrational transportation phenomenon increases the cost of road transportation and limits the development of the road transportation industry. This paper analyzes the problem of empty driving in road transportation and the reasons for it, and finds that the lack of information and the lack of centralized information system are the main reasons for the phenomenon of empty driving. Combining the research results of scholars and the current status of the road transportation information system, we have constructed a road transportation system that meets current needs. Integrated road transportation information system. The integrated system redesigned functions and processes from the aspects of collection, management, and distribution of transportation information. Not only for the problem of empty driving, but also for all kinds of irrational transportation phenomena caused by poor information, it has constructive significance.*

## Keywords

*Highway transportation; Empty driving; Information system; Integrated system*

## Introduction

Road cargo transportation is the largest and most commonly used one of the current cargo transportation methods in my country, and it is the mainstay of the logistics transportation industry. 70% of the entire cargo transportation business is undertaken by road transportation. At the same time, the turnover volume of 712 million ton-kilometers is among the best in the world. Based on the unit price of road cargo transportation at 0.76 yuan/ton-kilometer, it can be concluded that the scale of road cargo transportation in my country is about At 540 million, the growth of road cargo transportation is very large, and road transportation will usher in huge room for development.

Although the total cost of logistics required by the whole society as a percentage of the GDP of the national economy dropped from 18.1% to 15.5% in the ten years after 2009, there is still a big gap with the advanced developed countries in the western logistics industry. my country's vast territory has caused uneven distribution of roads across the country, uneven distribution of industrial scale, poor integration of the entire market, and lack of effective information management. While the industry is booming, many problems have also arisen:

1. Always maintain a medium-to-high-speed growth of the overall capacity, the overall structure of cargo transportation needs to be further improved, and the logistics infrastructure still has big defects compared to countries with the same market size.
2. For market entities, integration is poor, extensive scale operations are common, and companies cannot quickly adapt to larger market changes.
3. The construction of the legal and regulatory system is generally incomplete, and the jurisdiction of the national government is insufficient.
4. Due to small, chaotic, scattered, miscellaneous and other industry issues, many unreasonable transportation phenomena have been caused.

Among these existing problems, irrational transportation phenomena are numerous and complicated, which has become an urgent problem that restricts the sustainable and healthy development of road transportation in my country.

Unreasonable transportation refers to the failure of the overall transportation level to properly match the transportation conditions, resulting in waste of time, personnel, expenses and many other aspects. Many unreasonable transportation phenomena have become a major problem that restricts transportation efficiency. To reduce the overall transportation cost, it is necessary to avoid a series of problems caused by unreasonable transportation phenomena.

Among the unreasonable phenomena of road transportation, there are two more prominent ones: one is unreasonable transportation related to improper choice of consignment mode, such as giving up the whole vehicle and choosing less than carload, and choosing direct instead of transit; the other is related to Unreasonable transportation related to the transportation direction, including convection, reverse flow, and cross transportation. The most serious one is the empty driving problem.

The problem of empty driving, as the name implies, is empty driving, including departure and return. In the process of road transportation, it is impossible to avoid empty vehicles in an absolute sense. In most cases, empty driving is still a necessary transportation operation process. However, after all, it is unreasonable transportation, the waste of resources it brings and the efficiency it affects. The problem also brings great harm. It wastes human and material resources unevenly, and it also affects economic benefits to a large extent. The overall design of road transportation is not scientific enough, the entire network structure is unreasonable, and the integration and informationization of the road transportation system is low. The empty-load rate of the entire transportation process exceeds 50%, and there is only a single load behavior in the process of transportation. Seriously. The cost of no-load is included in the total cost of logistics, which is one of the reasons why the total cost of road transport logistics remains high.

As we all know, there is a contradictory relationship between logistics service level and logistics cost. The two alternate gains and losses. If you want to improve customer satisfaction through service level, then the cost will definitely rise, and the profit that the company can earn will correspond to The reduction. Therefore, if you want to improve the efficiency of the company's operations and increase customer satisfaction while maintaining a relatively reasonable cost, it is necessary to start with the department with the most potential for improvement. The empty driving in the transportation process is a very difficult cost waste link, and because of this, it has considerable optimization potential.

## Analysis of the Problem of Empty Driving in Highway Transportation

At present, my country's road transport empty-load rate remains high, and neither in terms of infrastructure nor the construction of the overall transport network link can be compared with Western developed countries. It is in its infancy as a whole and has great development potential to be tapped. On the macro level, the lack of a unified socialization and enterprise cooperation business model has made it difficult to realize regional large-scale transportation and the management of transportation supervision departments is lacking. At the micro level, most of the logistics companies on the market today have a low degree of informatization, and there is no integrated logistics information network and integrated management information system, which makes it difficult to effectively implement a reasonable transportation configuration between vehicles and goods. . By analyzing the reasons for the high empty driving rate of road transportation, find effective solutions to promote the healthy development of road transportation industry.

### Main Cause of Idling Phenomenon

In road transportation, vehicles, goods, people, and markets are organisms with a flexible relationship. The deviation of any one of them may result in the result of having cars but not goods, or goods but not cars. Through the analysis of the current situation of road transportation, it is concluded that the main reasons for the empty driving problem of road transportation are as follows: individual transportation limitations, transportation resources are scattered and not centralized, freight information is not smooth, and freight information platforms lack centralized and unification.

(1) Individual transportation limitations

The main body of my country's road transportation business is bulk general cargo, of which the individual transportation industry accounts for the largest proportion, accounting for about 80%. With the development of the entire industry, the self-employment is still growing steadily year by year. However, with the development of individual transportation, its limitations Sex is also slowly revealed, which has become a main reason for the high idling rate.

First of all, cargo owners in the entire transportation market are basically fixed and limited, while a large number of business entities on the market are small, scattered, and chaotic. They compete for limited supply of goods, which has led to a series of unfair competition and caused chaos in the entire transportation indus-

try. It has become a common phenomenon for vehicles to contact cargo owners during transportation. Individual transportation cannot be compared with professional transportation companies. Without professional personnel management, reasonable resource allocation, or even good publicity methods, it can only increase the vehicle delivery rate to improve its own efficiency, and is forced to constantly find empty vehicles.

Self-employed transporters cannot undertake specialized transportation operations, but can only undertake transportation tasks relative to ordinary goods. Moreover, the overall personnel and professional quality of self-employed individuals are not high enough. It is inevitable that they will not be able to meet a series of requirements of the client, so they can only give up transportation opportunities . The general cargo transportation market has been saturated on a large scale. The competition between self-employed and professional transportation companies has intensified. The high empty load rate is the inevitable result of the industry.

(2) Transport resources are scattered and not concentrated

There are many logistics and transportation enterprises on the market in our country, but most of them are scattered, without a certain industry scale, cannot be centralized and unified management, and social connections are not close enough. The vast majority of logistics companies only focus on the development of the company itself, rather than on the overall allocation of resources. There is no sense of mutual cooperation between enterprises, and they lack advanced logistics concepts.

Fresh agricultural products, daily necessities, fresh-keeping food, clothing, medicines, home appliances, household items, etc., although belonging to bulk commodities, are not uniformly allocated. For example, in the transportation and distribution of dangerous goods and refrigerated goods, more details need to be paid attention to and the transportation is more difficult, which further leads to the particularity of its transportation, thereby increasing the difficulty of backhaul stowage, and empty transportation is inevitable.

In the entire road transportation industry, there is no reasonable resource allocation system. Individual merchants are only interested in their own interests, and they refuse to cooperate in loading and resource sharing. The national and local management departments have not introduced corresponding transportation resource integration mechanisms, which has caused a large number of vehicles to be difficult to load on the return journey, which has led to an increase in the problem of empty driving.

(3) Shipping information is not smooth

More than half of the individual transport operators mainly rely on the Freight Information Department to collect freight information. Both local and foreign operators must obtain information based on this, and there are certain requirements for transport business capabilities. And there are the following problems:

The Freight Information Department does not have a complete industry operation specification, and the reliability of freight information remains to be verified. The freight information department does not have high requirements on the quality of personnel and business level. One person, one table and one computer, can operate in the store after registration. Many of them are weak, and the small-scale freight information department disseminates false cargo information, harming the interests of the transportation industry, and there

are no rules and regulations that can be rigidly restrained. This has caused the car owners to only rely on a few freight information departments with standardized management and high information reliability, and the source of goods is far away from the place of unloading. This has resulted in frequent inter-city and inter-provincial long-distance transportation, half-way back and forth. No-load phenomenon occurs frequently.

At present, there is a lack of a large and complete logistics information platform, and only relying on independent small freight information departments, freight information and other resources cannot be shared on a large scale. The existence of the scattered freight information department has not substantially changed the current situation of unsmooth freight information.

(4) Lack of centralized and unified freight information platform

my country's logistics and transportation industry is developing steadily, but the level of industrial intensification, informatization, and scientific intelligence are all low. Most logistics companies have a low degree of informatization, unable to obtain first-hand vehicle and cargo source information in time, and cannot update it in time, and vehicle owners and cargo owners cannot communicate in time, resulting in a large number of empty return trips and high empty load rates. The transportation efficiency of SMEs has been greatly affected.

Most of the current logistics information systems on the market are for the internal service of the enterprise. They are not market-oriented and have a low degree of intensification, which cannot achieve a reasonable allocation of information resources. Most of the emerging logistics information platforms have low levels of intelligence and cannot gain market trust, causing cargo owners to be reluctant to upload them to the platform in order to protect their supply information. Because of this, companies cannot use freight information platforms to achieve unified and centralized management, and they cannot achieve large-scale dispatching. It is difficult to load across cities and provinces.

## Targeted Improvement Ideas for Idling Phenomenon

The road transportation industry is not an isolated industry, but a market-oriented and collaborative social activity. It is not that the change of enterprises in a region or a small area can solve the problem of empty driving. The entire market is coordinated on a large scale and scientifically managed and operated. As well as information construction, it is still essential to solve most of the unreasonable phenomena of transportation including empty driving. To break the status quo of industry and subordinate freight division, tap the potential of empty and under-loaded transportation, and implement reasonable transportation, it is necessary to strengthen the comprehensive management of transportation and the level of information service to realize network transportation. The state implements institutional reforms, individual merchants and highway transportation industry departments intensify resource integration efforts, and establish a sound integrated logistics information platform.

(1) Improve the management level of transportation enterprises

If a transportation company wants to abandon the outdated management and business model, it must put its own management level in the first place, fully absorb advanced management concepts, use scientific manage-

ment systems, and introduce professional logistics management talents, especially fully Use the information platform to deploy transportation information, strengthen information exchange and cooperation with peers, combine its own situation, maximize the use of technology and data, and minimize the empty driving rate.

For small-scale transportation companies, we must seek cooperation with large companies, effectively utilize the cargo resources of large companies, learn advanced management models of large companies, and establish a complete and efficient transportation management joint system.

(2) Effective integration of transportation resources

So far, the degree of intensive management of the road transportation industry is very low, the transportation units are small and scattered, there are few enterprises with perfect qualifications, and the lack of professionalism is mostly self-employed. The lack of specialization has caused the problem of empty driving. The relevant state departments should vigorously promote the cooperation between small enterprises and large-scale enterprises, strengthen the standardized management of individual transportation units, and enable the steady development of road transportation to the centralized cooperation between large and small enterprises.

Large-scale large-scale enterprises have advanced industrial technology, high-quality basic equipment, high-end logistics management professionals, and have a complete set of rules and regulations in terms of operating procedures and vehicle management methods. However, small, scattered and single transportation companies cannot have an intensive management model, cannot enjoy unified deployment of transportation resources, cannot reflect the advantages of large-scale transportation, and cannot obtain any advantages in the transportation market. Therefore, small transportation companies should increase their cooperation with The scale of cooperation between large-scale enterprises uses their management and freight resources to develop a cooperative and efficient transportation industry market.

(3) Establish an integrated road transportation information system

The informatization of my country's road transportation industry started late, and its development is relatively slow, and the degree of modernization is low, so scientific management methods must be used. The traditional transportation information system has a single structure and function, which cannot meet the increasingly complex road transportation situation, and it is not accurate and efficient in any link in the transportation process. Therefore, it is of great significance to research and develop an integrated road transportation system. The integrated transportation information system can connect and share a variety of mature road transportation technologies and systems, and realize the relative independence of each part of the system under an integrated system. It is also integrated and complementary, reducing the empty driving rate of vehicles to the greatest extent, reducing resource waste, and saving transportation economic costs.

Logistics information plays a vital role in the transportation industry. Whether it is the management level of logistics enterprises that needs to be improved, or the transportation and cargo resources that need to be integrated, it depends on the effective configuration and delivery of logistics information. Today's road freight transportation in my country is facing a serious problem of unblocked information, and the existing freight information platform cannot achieve unified online integration. Even if the platform can provide freight infor-

mation, there will always be information deviations, and both vehicle and cargo owners cannot communicate in time.

## Construction of Integrated Road Transportation Information System

At present, my country's highway transportation information system is still in the initial stage of development, the system is not yet perfect, and the degree of integration is lacking. Combine the development status, existing problems and various characteristics of road transportation to build an integrated road transportation information system, use mature technologies and systems for structural integration and resource circulation, and build integration from three aspects: information distribution, management and control, and collection The system not only achieves the integration of resources, but also the integration of functions, which has a very positive significance for the problem of empty vehicles caused by poor transportation information.

## System Integration

In the computer field, System Integration (Information Integeration) was proposed by Dr. Joseph Harrington as early as 1973. System integration is considered not only the integration of information but also the integration of services and business processes to achieve the optimization of the overall enterprise and enhance the response efficiency of the industry. From the perspective of computer technology, functions, information, and equipment are integrated through the wiring and assembly of structures and functions. Optimize resource sharing and improve corporate management efficiency.

From the perspective of system integration, this paper solves the problem of empty driving caused by the lack of information. Through the integration of mature small systems and technologies, a new integrated road transportation information system is constructed to achieve the dual integration of data and services.

### Transportation Information Technology and System

Currently, the information technologies and systems available on the market for tracking and querying logistics information include: Frequency Radio Identification Technology (RFID), Web Geographic Information System (WEBGIS), Beidou Satellite Navigation System (BDS), Traffic Information Collection System (TICS), Intelligent Transportation system (ITS).

(1) Radio Frequency Identification Technology (RFID)

Radio frequency identification, RFID (Radio Frequency Identification) technology, also known as radio frequency identification, also known as electronic tags, is a commonly used communication technology. It does not need to establish a special contact with the recognized object, and only needs to read and write data through a simple radio signal. The recognition distance is a few centimeters at the shortest, and the longest can be up to several meters. It can quickly and accurately record thousands of bytes. For remote vehicle identification, it is more adaptable and adaptable than ordinary bar code technology.

In road transportation, you can use radio frequency identification technology for vehicles and containers, and label the vehicles or containers. When the vehicle leaves the place of departure, enters the local area from outside, arrives at the destination, and passes through the transportation and logistics nodes, pass the radio frequency The identification equipment identifies the tags on the vehicle, and quickly uploads the identified information to the management terminal of the information system. This enables dynamic tracking and management of vehicles in transit. At the beginning and end of the entire transportation process, the entire information is entered to improve transportation efficiency.

(2) Web Geographic Information System (WEBGIS)

Traditional geographic information systems provide high-quality information analysis capabilities and visualized geospatial information computing capabilities for road transportation. However, they are limited by limited networks and cannot meet complex and changing road conditions and vehicle loading conditions that change at any time during transportation. The network geographic information system complements the original functions and modes by carrying the Internet, and can realize the GIS function under the network environment, and judge geographic information and analyze spatial data through network nodes extending in all directions.

In the highway transportation information system, the network geographic information system is used as the support of the entire integrated system, and all other systems and technologies are established on the basis of the geographic information system to realize geographic information analysis in the entire transportation process. The system provides favorable support for the sharing of traffic management resources, information management and integration, and the realization of command and dispatch in the process of road transportation.

(3) Beidou Satellite Navigation System (BDS)

China's BeiDou Navigation Satellite System (BDS) is a global positioning system developed by China. It is also developed and operated by China. Compared with the frequently used American GPS satellite positioning system, it exclusively strengthens communication and Navigation capabilities, with five major functions: precise timing, real-time navigation, rapid positioning, position reporting, and short message communication services. It can integrate navigation signals from many locations and use multi-location and multi-frequency signal fusion to improve service efficiency. It is more suitable for local China Navigation and positioning.

The Beidou satellite navigation system used in the highway transportation information system can display the real-time position of the transportation vehicle anytime and anywhere, and update it in time with the movement of the vehicle, and it can also realize the tracking of multiple locations and multiple targets at the same time. The unique short message communication service function of the Beidou satellite navigation system can also enable vehicles to upload and feedback information on road conditions, vehicles, and goods in time. This is also a more informationized advancement for traditional GPS technology. The use of Beidou satellite navigation system in the road transportation integrated information system increases the real-time tracking and transmission feedback of vehicle information, which can effectively monitor the operation of vehicles, deploy the nearest goods, and greatly reduce the vehicle empty rate.

(4) Traffic Information Collection System (TICS)

Traffic Information Collecting System (Traffic Information Collecting System) collects traffic information through sensors and cameras on the vehicle and on the side of the road, including the collection, processing and release of dynamic information such as road conditions, driving speed, control information, parking lots, and weather. It is a traffic system An important part of intelligence. When the road vehicles increase significantly and the traffic pressure doubles, TICS can obtain static and dynamic road information, judge the traffic flow, road transportation status, etc., and realize instant feedback and update through real-time information exchange with drivers. Provide decision-making services for vehicle scheduling.

In the highway transportation information system, the traffic information collection system can collect and analyze the static information such as road condition information, highway network information and dynamic information such as traffic flow and road occupancy rate, and analyze the data through the communication interface. It is delegated to the Intelligent Transportation System (ITS) to function as a transit point for traffic data.

(5) Intelligent Transportation System (ITS)

Intelligent traffic system (Intelligent Traffic System, referred to as ITS), is the comprehensive application of advanced science and technology (data communication technology, computer technology, automatic control theory, sensor technology, electronic control technology, operations research, artificial intelligence, etc.) to vehicles Manufacturing, service control and transportation, establish a transportation management system with a wide range of functions, scientific accuracy and high efficiency. ITS is at the downstream of TICS, effectively accepting upstream information and functions, and organically unifies users, vehicles and roads. According to the application of ITS in a certain area, it is predicted that the benefits in 2015 will be: reduce traffic congestion by 10%~50%; reduce enterprise operating costs by 5%~25%; reduce accidents by 30%~60%.

In the road transportation information system, as the downstream system and core management and control system for traffic information collection, ITS analyzes the collected road transportation information through big data and algorithms, and rationally allocates goods and vehicles, striving for the most economical premise To achieve the most efficient stowage under Traffic participants can make timely judgments on road conditions and cargo information based on the received information, and respond in accordance with instructions to minimize empty vehicle driving rates and improve economic benefits.

## System Operation Mechanism

This highway transportation information system will adopt system integration methods, starting from the three functions of information collection, management and control, and distribution. The platform will be designed on the basis of system modularization, and the relatively complex system will be functionally divided into small ones. Module. The integrated interface is connected to the hardware facilities of this system to realize the calculation, analysis, management and distribution of information data. Every time the vehicle passes through a logistics node from the place of origin, it will pass through the radio frequency identification device, scan the barcode carried by the body, and record the time and location of the current information

through the port to upload to the information control terminal, and then pass through other information such as cargo information and road conditions The algorithm designs the optimal driving path and delegates it to the owner. Through the efficient use of space, time, mobile and fixed resources, human and data resources related to road transportation, the intelligent collection, transmission, processing and sharing of information are realized, so as to achieve smooth transmission and effective integration of information between systems. Information network, data communication, and intelligent control realize the sharing of information resources among the collector, system and client.

### Flow Description

The data process is mainly used by the shipper and vehicle owner in road transportation. The two parties can still communicate and timely feedback through the built-in communication message function of the Beidou satellite positioning system and its traditional methods. Under the background that traditional contact methods are prone to empty driving problems, it is equipped with an integrated road transportation information system.

Step 1: the cargo owner uploads the cargo information and the cargo task, carrying capacity, transportation status and other information of the vehicle to the cargo information collection terminal of the system

Step 2: When vehicles are loading and unloading goods through logistics nodes and freight stations, they scan the external bar code information of the vehicle through RFID frequency radio recognition technology and enter it, and upload it to the vehicle information collection terminal of the system

Step 3: upload the collected vehicle and cargo information to the intelligent transportation system through the traffic information collection system, and input the corresponding road condition information through the network geographic information system

Step 4: The intelligent transportation system is the core management and control part. Through algorithm analysis of cargo, vehicles, and road condition information, big data calculations, etc., a reasonable freight plan is finally transferred to the owner.

## Application Prospect of Integrated Information System

With the continuous improvement of the level of science and technology and the strengthening of government supervision, the country is also paying more and more attention to the development of road transportation and its information technology. The design and application of integrated information systems will receive dual support from policies and funds. The integrated road transportation information system not only provides a more efficient and convenient channel for the circulation of road information, but also effectively avoids the problem of empty driving due to poor information and imperfect information systems. Therefore, it is imperative to build an integrated road transportation information system.

However, there is still a gap between my country’s technical level and developed countries, and the manage-

ment system and its own technology are immature. To further promote the development of informatization and systemization of highway transportation, it is necessary to introduce advanced logistics and information system talents, standardize the transportation information market, and respond to the call of the state.

## Realistic Value of Information System

(1) System integration learns from each other

Through the process-based reengineering of the transportation information system, the effective integration of information resources has not only avoided the unsmooth communication of freight information, but also improved the efficiency of road freight, greatly reduced the empty rate, and thus reduced the transportation cost. The integrated integration of a variety of mature systems and technologies combines the advantages of a single system, and at the same time makes up for the shortcomings of its incompleteness and single function. The system is easy to operate and highly visible. It is equipped with a high-speed network to update vehicle and cargo information anytime and anywhere, minimizing the waste of resources and the loss of empty vehicles.

(2) Optimize the allocation of market information resources

The application of information technology can strengthen the management of all aspects in the field, optimize the state of internal resource allocation, and can organically integrate various resources. At present, information technology is mainly used in the management of highway transportation information. Therefore, with the development of the highway transportation industry, highway information management technology has also been developed and strengthened. At the same time, we can first strengthen economic management through information management, constrain economic conditions in different periods, and deal with problems in a timely manner when problems are discovered. Secondly, highway transportation companies understand the needs of the market through the application of information technology and discover their own shortcomings in order to effectively realize the optimal allocation of resources. And through the analysis of market data to help companies adjust the economic direction to further meet the needs of the market.

(3) Effectively reduce empty driving rate

The construction of the information system relies on professional logistics technology and mature information systems, integrates and optimizes existing resources and further extends outwards, while introducing advanced information technology methods such as cargo tracking and positioning, visualization technology, and mobile information technology to truly realize logistics network informatization. It greatly reduces the empty driving problem caused by the lack of logistics information and the lack of centralized information system.

(4) Information System Application Outlook

In contemporary times, more and more companies are introducing information technology as their own technical support, and the integration of information systems is a more efficient choice. Only by making full use of good information management technology can we have a more comprehensive grasp of the development

trend of road transportation, and timely discover and solve unreasonable problems in road transportation. In the process of informatization construction, there is a big gap between my country and western developed countries in terms of technology and management, and the degree of informatization of management is lacking. Therefore, for the long-term development of the logistics and transportation industry, the national government must increase the intensity and capital investment in the construction of logistics informatization, and the relevant departments shall issue laws, regulations and policies to improve the behavior of the transportation industry, ensure that the entire transportation process is manageable and controllable, and ensure the management of the transportation industry The improvement of the level and the increase of the degree of informatization ensure the fundamental role of information technology. The issue of talents also requires close attention, vigorously develop new logistics management talents, strengthen the training of talents in information technology, introduce advanced talents, train relevant talents, and retain reliable talents. Finally, starting from the Internet, sharing network resources and building a complete transportation service system can better serve consumers, meet consumer needs, and realize the efficient and stable development of road transportation economy.

## Summary

With the rapid development of my country's logistics industry, road transportation occupies an increasingly important position, and the multi-faceted waste of resources caused by empty trucks also seriously affects the optimization of my country's logistics costs. There are many reasons for the empty driving, and the most important reason is the lack of information in the transportation process and the lack of a centralized and unified information system. The era of information blockage has passed, and we are in an era of rapid development of information. A single transportation information system has many shortcomings. In road transportation, vehicle owners, cargo owners, and subject matter are not a simple unified combination, but are more flexible, and various mature technologies are effectively used to build integrated roads. The transportation information system strives for information management and control from the entire transportation process. This is not only an effective improvement measure for the empty driving problem, but also a constructive effect on various unreasonable transportation phenomena caused by poor information and the lack of a centralized and unified information system.

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