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The Causes and Measures of the Innovation of Railway Transportation Innovation

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Abstract: Railway is the economic lifeline of a country. It is the basic industry for the development of the country and society. Railway transportation is one of the most important ones, and it is at the backbone of the national transportation system. If we do not give more attention and support to the construction of the railway, then the transportation of various materials and personnel of the society will be greatly affected, thus hindering the healthy development of the national economy. Due to the weak overall foundation and backward technology of China's railway industry, the railway transportation industry has become the top priority of state-owned enterprise restructuring. Therefore, this paper introduces the problems existing in China's railway transportation industry, and discusses the ideas of China's railway transportation industry reform. It also discusses the innovation of railway transportation enterprises in terms of technology, business philosophy and internal management methods. Experimental research shows that compared to traditional railway dispatching systems, the innovative railway dispatching system based on the ant colony algorithm model studied in this paper is superior in many aspects, especially in railway task management exceeding 15%, which fully reflects This paper studies the feasibility.

1. Introduction

With the deepening of reform and opening up and the adjustment of the economic industrial structure, China's transportation enterprises have shown unprecedented vitality. A variety of modes of transportation are “All flowers bloom together”, and various modes of transportation are developing rapidly. Although the transportation volume of railway transportation has increased year by year, the market share has been declining year by year. The railway industry is facing competition with other transportation industries. It faces the severe challenges of improving management level and developing innovation, and must be reformed. Since railway transportation plays a fundamental role in the country's economy and transportation system, reform must be cautious. Therefore, before the reform is implemented, it is necessary to have a clear-cut and

clear-cut development strategy guideline in order to make the reform progress smoothly to the intended goal. The transportation volume of railway transportation is increasing year by year, but it has gradually lost its advantages in the fierce market, and the development of the railway industry faces enormous challenges. In order to improve the market share of railway transportation and ensure the smooth development of the railway transportation industry, it is necessary to carry out in-depth reform and innovation of railway transportation, and based on clear reform ideas and directions, formulate correct development strategies, and make reforms and the goal of innovation is more accurate.

2. Problems in China's Railway Transportation Industry

As a traditional industry, China's railways have a history of development for hundreds of years. In the 21st century, the railway transportation industry in developed countries has gradually completed the transition from traditional industries to modern industries, reviving the traditional industry of railways. In contrast, the reform of China's railway transportation industry is obviously lagging behind, and there is a clear gap with developed countries.

Before the implementation of reform and opening up in China, the railway industry has been managed in accordance with the planned economic system, and the government and enterprises are indivisible. This management system is compatible with the economic model in which China was planned economy at the time and the external operating environment of the railway industry. However, after the reform and opening up, the economic growth model has changed from a planned economy to a market economy. Especially after joining the WTO, the current "political and enterprise integration" management system of China's railways is increasingly unable to adapt to the development of the situation, and the shortcomings of the shortage of transportation capacity is getting more and more prominent.

In addition to the contradiction between the transportation capacity and the transportation demand, there are also deep-seated reasons for the shortage of transportation capacity of railway transportation. The main manifestations are as follows. Firstly, the modern transportation awareness is thin. In contemporary China, due to the small-scale peasant consciousness left over by the long-term feudal society, people are conservative and closed, and the economic impact of the planned economy for decades is even more rigid. People have not completely accepted the idea of economic development and transportation from the heart, and lack of understanding of an efficient, smooth and fast modern transportation management model. Even if there are measures to improve the transportation and transportation industries, it is limited to local areas. It cannot be considered from the overall perspective of the national market or even the global market. The time and scope of these measures are very limited, and the fundamental problems cannot be solved. Secondly, the social economy is underdeveloped. The main contradiction in China is still the contradiction between the people's growing material and cultural needs and the backward social productivity. Therefore, the development of the economy is still China’s current priority. Nowadays, people are turning their attention to industries with short cycle and quick effect. For the basic industry of railway transportation industry, there is less concern, resulting in the current situation of poor facilities and low management.

Before the 1980s, the development of the railway industry was managed and regulated in accordance with the system of the planned economy. The relationship between the government and enterprises was intertwined and the relationship was inseparable. However, after the reform and opening up, especially after China entered the international trade organization in the early 21st century, the railway transportation management under the planned economic system has many drawbacks. The mode of integration of government and enterprises has seriously affected the

sustainable development of the railway industry, which is an important reason for the shortage of railway transportation capacity. In addition to the historical reasons mentioned above, there are two deep reasons for the shortage of railway transportation capacity: one reason is that people's transportation awareness is relatively thin, people lack understanding of modern transportation management innovation and reform, making reform and Innovation is difficult to carry out in depth. Another reason is that the socio-economic development is relatively slow. There is still a contradiction between the demand for transportation and the productivity of the society. The development of the railway has not fully met the needs of the people, and the investment and support for railway facilities is relatively small. The equipment and management of the railway are relatively backward.

3. The Problems and Solutions of Railway Transportation

Continue to Uphold And Improve The Economic Responsibility System Of Large-Scale Contract And Rationalize The Internal Economic Relations Of The Railway.

The branch office is a comprehensive operation unit and is the most basic unit for synthesizing railway transportation products. Only when the branch office is full of vitality and vitality can the railway transportation develop continuously. Therefore, it is necessary to conscientiously implement the "Enterprise Law" and manage it for its own operations through contracting and transformation. Under the conditions of ensuring the transportation of key materials and the unified dispatching of transportation to the national economy and the people's livelihood, the branch office can flexibly and autonomously carry out passenger and cargo operations and give greater autonomy.

The transformation of railways from state-owned to state-owned roads reflects the separation of ownership and management rights. However, due to external factors such as the sharp rise in prices, the railways could not make ends meet. The original “contracting” and “output” of the contracting schemes were actually unacceptable and should be adjusted accordingly. Firstly, the contracting tasks should be active and reliable, fully embodying the spirit of speaking the overall situation and contributing more. Secondly, we must talk about science, contracting tasks should be practical, controllable, and adapt to the dynamic economic environment. Thirdly, we must focus on invigorating enterprises and adjust relevant the policy leaves room for development, guarantees the simple production of the railway, increases the conditions of the safety factor, and has the ability to adapt to the expansion and reproduction, leaving a certain reserve force for the railway, so that the transportation production will embark on a virtuous cycle. It is necessary to rationalize the economic relationship between the distribution relationship and the enterprise, make it conform to the law of value, combine responsibility, power and profit, and mobilize the polarity of each party.

Although the railway transport price has been adjusted many times, it is still low, and there are irrational phenomena, which seriously restricts the railway's ability to raise capital and self-development.

The reform of transport price is a complicated system project. It should be carried out actively and steadily. It is not appropriate to die in accordance with local conditions. It is necessary to make use of the leverage of the transport price economy, adjust the transportation structure, and transport the market supply and demand relationship so that it basically conforms to the law of value. A floating method of linking freight rates to prices should be established to meet the needs of the development of commodity economy. Under the premise of unified freight rates, a variety of tariff policies will be implemented to supplement and improve. Such as: new lines, insufficient traffic, lines, special economic zones, inbound and outbound railways, air-conditioned trains, tourist trains, high general costs, special tariffs should be implemented, so that the railway will not lose money in areas where capacity constraints are restricted, and fare increases are imposed. It naturally diverts to

other modes of transportation and reduces railway pressure. According to different seasons, the change of passenger and cargo flow in the hot line and the popular trains implement the seasonal floating freight rate (according to the civil aviation method) to control a certain direction. (eg: go to Guangzhou) overheated demand; implement a two-track system operation, the planned national distribution of materials to implement unified freight rates, and the unplanned market to adjust materials to implement bargaining rates. All these methods are nothing more than increasing road revenue, raising construction funds, mobilizing the enthusiasm of enterprise employees, and making the railway take a virtuous cycle.

Simply relying on the railway to build a railway can't meet the needs, and must be further open to the outside, wide-ranging funds, and building roads in multiple forms. To this end, it is necessary to implement tariff reforms, raise capital for construction through multiple channels, and accelerate railway construction. Policies should be formulated to ensure the management system, management methods, and distribution of benefits. It is necessary to implement the principle of overall planning, block integration, tiered responsibility, and joint construction. The railway has already begun to explore this aspect. Some successful experiences such as "Guangshen Model", "Sanmao Mode" and "Beijing-Kowloon Railway Model" should continue along this road.

4. Measures for Railway Transportation Innovation Reform

4.1. Standardization of Modern Enterprise Company System

Due to the institutional problems left over from history, it is difficult to implement the "separation of government and enterprise". However, under the strong promotion of the state, the government and enterprises have fulfilled their responsibilities and performed their duties. On this basis, the railway transportation industry also needs to standardize and amend the modern enterprise system, and establish an effective incentive mechanism, constraint mechanism and a unified system of responsibility, rights and rights within the enterprise. For those enterprises that have survived and developed rapidly in the fierce market competition, they can reduce the share of state-owned shares within the enterprise to less than 49%, and let the private sector hold more than half of the shares, making the management of the state's railways from the management of state functions to industry management. This has transformed the country's functions in the railway transportation industry, enabling railway transportation to achieve more long-term development in the market environment.

4.2. Introduction and Development of Railway Transportation Industry Technology

Our national railway system has been formed through years of research and development. The various technologies in the railway industry are relatively leading, but there is still a certain gap compared with developed countries. In order to promote the better development of the railway transportation industry, in addition to actively introducing advanced railway transportation technology, we should also conduct internal self-research and development. In order to achieve self-development, it is necessary to improve the professionalism and skills of railway R&D personnel to ensure the efficiency of R&D. The managers of railway enterprises must change their management concepts, and cannot pursue high performance blindly, but neglect the responsibility of responsibility. In the past, in order to obtain more economic benefits and disregard the impact on the ecological environment, many railway enterprises have lost their social benefits even though they have obtained certain economic benefits. Therefore, when conducting management, railway enterprises should pay attention to social benefits, protect the environment, and achieve "harmony between man and nature" while establishing a business philosophy of least investment and high-efficiency output, thereby realizing the sustainable development of the railway transportation

industry.

5. Analysis of Railway Transportation Dispatching Based on Ant Colony Algorithm Model

For the convenience of research, this paper abstracts the railway station yard operation point into n algorithm search nodes, and introduces the basic ant colony algorithm model by searching the optimal node sequence for the nodes. The basic ant colony algorithm model can be expressed as follows:

Suppose the maximum number of ants in the ant colony algorithm is m, and the railway station operation point is abstracted into n nodes, dij (i,j=1,2,3...,n) represents the distance between the station node i and j Path cost, the algorithm stipulates that each ant corresponds to a taboo table tabuk, which records the nodes that the ant has traversed, and at the same time sets the first element in each taboo table to the node where they are currently located. Let τij(t) be i, the amount of information of the j path at time t, the initial pheromone of each path is set to a constant, τij(0)=C where C is a small constant. When each ant chooses the next node, the ant chooses the next node to arrive based on the residual pheromone and heuristic information on the path. It is defined that at time t, the probability that ant k chooses from node i to node $p_{ij}^{k}(t)$ The calculation formula of k (t), $p_{ij}^{k}(t)$ is:

$$p_{ij}^{k}(t)=\begin{cases}\dfrac{\tau_{ij}^{\alpha}(t)\eta_{ij}^{\beta}(t)}{\sum_{s\in j_k(i)}\tau_{is}^{\alpha}(t)\eta_{is}^{\beta}}, j\in j_k(i)\\ o, else\end{cases} \tag{1}$$

When the ant completes an iteration, the path pheromone between nodes is updated as follows:

$$\tau_{ij}(t+n)=(1-\rho)*\tau_{ij}(t)+\Delta\tau_{ij} \tag{2}$$

$$\Delta\tau_{ij}=\sum_{k=1}^{m}\Delta\tau_{ij}^{k} \tag{3}$$

6. Experimental Research on Railway Transport Innovation

6.1. Experimental Program

In order to make this experiment more scientific and effective, this experiment compares the traditional railway transportation dispatching system with the railway transportation dispatching system based on the ant colony algorithm model studied in this article to judge the feasibility of the research content of this article. This time, by running two algorithms on the computer simulation software, the data obtained are statistically and analyzed using mathematical statistics. On this basis, this research conducted interviews with university railway engineering professors and recorded data through the Internet.

6.2. Research Method

(1) Price comparison analysis method

This research compares and analyzes the traditional transportation dispatching system based on the ant colony algorithm model studied in this paper to judge the feasibility of the research content of this article.

(2) Observation method

This study observes and records data based on the efficiency of running on the same data set. These data provide a reliable reference for the final research results of this article.

(3) Mathematical Statistics

Use related software to make statistics and analysis on the research results of this article.

(4) Interview method

This research conducted interviews with relevant railway engineering professors on the railway transportation dispatching performance based on the ant colony algorithm model studied in this article and recorded the data through the Internet. The recorded data was organized and statistics. These data not only provided reliability for the topic selection of this article. The reference of this article also provides data support for the research results of this article.

7. Analysis of Railway Transport Innovation Experiment

7.1. Comparative Analysis of Railway Dispatching System

In order to make this experiment more scientific and effective, this experiment compares the traditional railway dispatching system with the dispatching model system based on the ant colony algorithm studied in this paper. The data obtained is shown in Table 1.

Table 1. Comparative analysis of railway dispatching system

	Train operation management	Integrated maintenance management	System integration optimization	Others
Ant Colony Algorithm	72.3%	68.7%	66.2%	61.9%
Traditional	57.1%	59.7%	54.5%	52.9%

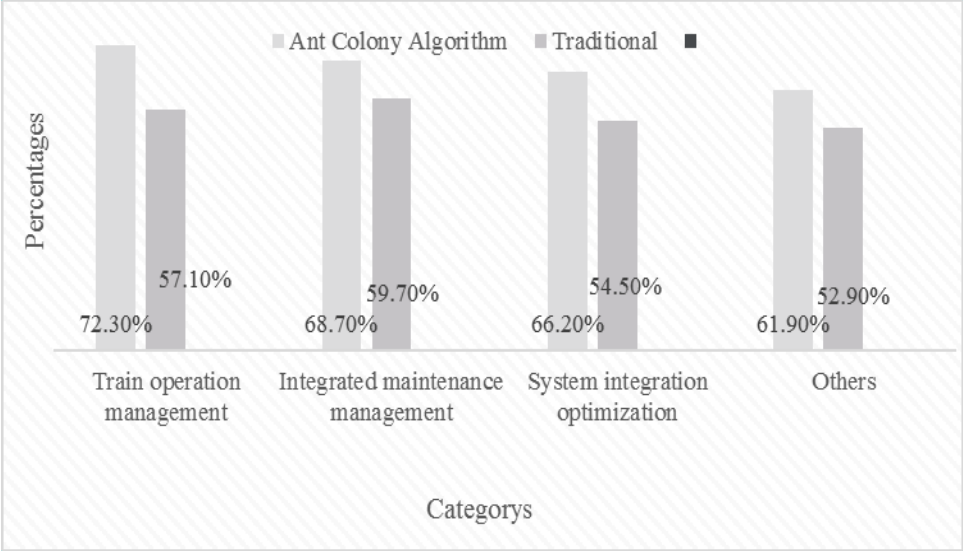

Figure 1. Comparative analysis of railway dispatching system

It can be seen from Figure 1 that compared to the traditional railway dispatching system, the innovative railway dispatching system based on the ant colony algorithm model studied in this paper is superior in many aspects, especially in terms of railway task management exceeding 15%, which fully reflects The feasibility of the study in this article.

7.2 Performance Analysis of Railway Dispatching System Based on Ant Colony Algorithm Model

In order to further research and analyze this experiment, this experiment analyzes the application performance of ant colony algorithm in the railway dispatching system by means of network interviews. The data obtained is shown in Table 2.

Table 2. Performance analysis of railway dispatching system based on ant colony algorithm model

	Safety	Convenience	Robustness	Accuracy
Man	6.45	7.06	7.75	7.29
Woman	6.98	6.48	7.26	8.34

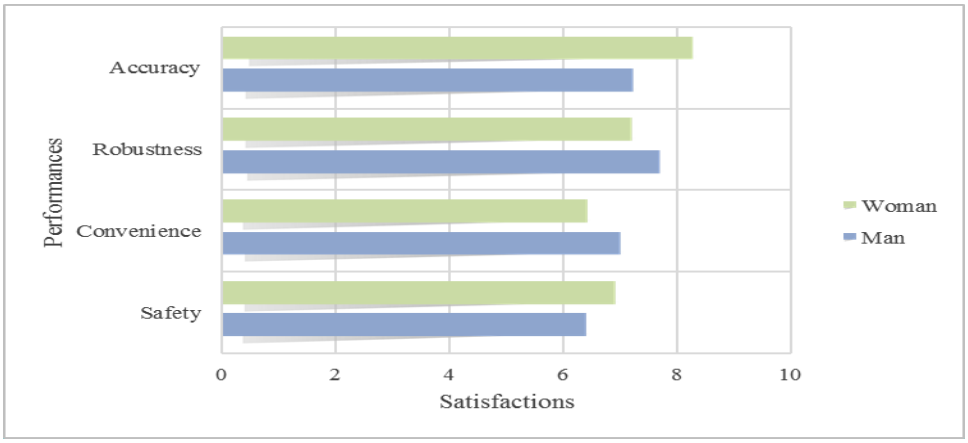

Figure2. Performance analysis of railway dispatching system based on ant colony algorithm model

It can be seen from Figure 2 that the performance evaluation of the railway dispatching system based on the ant colony algorithm model studied in this paper is above 5, which shows the feasibility of the study in this paper. Among them, the accuracy of railway dispatching is the highest, which fully reflects the feasibility of the research content of this article.

8. Summary

In general, the development strategy of the railway transportation industry is both a serious practical issue and a major theoretical issue. Through the historical review of China's railway construction and development and the comparative analysis of the Chinese and foreign railway industries, it is easy to draw the conclusion that the material basis of the railway transportation industry is weak. It is found that there is a shortage of transportation capacity, and there are still many places in management. Only these are not enough. The key to the problem is: How can the railway transportation industry make rapid progress in technology, continuously innovate in management, determine its own development strategy and how to realize its own development strategy in the era of fierce competition in the industry. The innovation of railway transportation innovation needs to go through a long-term process, not a one-step process. According to the development trend of the market, the railway enterprises should proceed from the actual situation of railway development, reform the internal system and norms of the enterprise, constantly improve the various systems, and cultivate more excellent management talents and R&D talents. The bold innovation of the railway transportation industry technology enables the railway to gain better development advantages in the highly competitive market and promote the sustainable development of the railway industry.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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