Research on Transportation Organization Modes for China Railway Express

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Abstract. In recent years, some cities in China have opened container rail lines to Europe. But their performances gradually show some problems, such as less supply, low frequency, high logistics cost, high no-load rate of backhaul, high financial subsidies of government and other issues. In order to solve these problems, we focused on the topic of how to improve the transportation organization scheme for China Railway Express. In this study, we firstly did a literature review on the China Railway Express. Then, we respectively described the two modes of transportation organization, and further analysed the advantages and disadvantages of the two modes. We concluded that the two modes have both advantages and inevitable disadvantages, and the operators of the China Railway Express should apply different modes according to different supply structure of goods, in order to improve the transport efficiency.

1. Introduction

Since the successful start of the Express train from Chongqing to Duisburg in March 2011, the China Railway Express has developed steadily, and the share of China Railway Express in the Asia-Europe international transportation market has increased year by year. In 2013, “One Belt and One Road” initiative was first proposed by China’s president Xi. The “One Belt and One Road” policy strongly confirms the importance of China Railway Express for international trade between China and Europe. With the continuous promotion of the “One Belt and One Road” policy, the economic and trade relations between China and Europe increased more frequent, and the demand for logistics market increased higher. Based on the extensive transportation network (including rail and road network), some cities in China have opened container rail lines to Europe successively, which has significantly supported the rapid development of China and other countries along the route. According to the official statistics, in 2017 there were 3673 trains running on the China Railway Express, an increase of 1971 ones, and increase by 116% in comparison to 2016. Among them, there are 2399 outbound trains, while 1274 inbound trains. The inbound trains are as much as 53% of the outbound train. These changes in the number of trains of the China Railway Express are shown in Figure 1.

With the rapid development of the China Railway Express, some problems have gradually emerged. Due to the influence of the local government subsidies to train services, these container train operation companies run their own businesses without cooperation, resulting in the disorderly competition between the container train operation companies, the low load rate, the low profit margin, high pressure upon the government to subsidize the trains and other issues. All of these above factors finally caused an increase of the cost of container trains.
Therefore, in order to solve these problems, it is necessary for us to do a study on the transportation organization scheme for China Railway Express.

Figure 1. The changes in the number of trains of the China Railway Express.

The above content is the introduction of the current status of the China Railway Express. The rest of this paper is organized as follows: Section 2 reviews the relevant literature on the China Railway Express. Two modes of transport organizations for the China Railway Express is described in Section 3. And a comparative analysis of two modes of transport organization is given in Section 4. Finally Section 5 presents the conclusion.

2. Literature review

In recent years, many researchers began to focus on the study about China Railway Express, including government policy analysis, development environment analysis, transportation duration analysis, transportation modal analysis and so on.

In terms of “One Belt and One Road” policy, Cheng [1] raised three general questions and gave the answers separately by himself. Jay Joong-Kun Cho [2] concluded that the Eurasian Continental Bridge dose not only help to reduce the transit time and transportation costs of goods, but will also strengthen the contact between Europe and Asia. Zhao [3] analyzed the characteristics of goods traded between China and Europe, then constructed generalized transportation cost function to study the influence of the China Railway Express on the maritime transport between China and Europe. Liu [4] studied how to select the transportation plan with the lowest transportation cost when the shipper faced different operation companies of China Railway Express. Wang [5] described the current situation of the freight volume and the transportation organization mode (“point to point”). And he put forward the main problems in the development of the China Railway Express from the three aspects of market demand, transportation organization and operation.

At present, most researchers studied the China Railway Express from the perspective of cost comparison, policy and efficiency analysis, and explored the ways to improve the transportation efficiency and reduce the transportation cost. Generally, there are some qualitative studies, and the analysis of transportation organization mode is seldom studied. In this study, we focused on the improvement of outbound transportation services and performances for China Railway Express. We put forward the consolidation transportation organization mode. First, we introduced the two modes in detail. Among these two modes, one is the direct train mode (which has been used); another is the consolidation mode (which has not yet been widely used). Then, in terms of these two modes of
transportation organization, we did a comparative analysis, and put forward some suggestions for optimization and improvement.

3. Description of the two modes of transportation organization

In recent years, there are two types of transport organization modes that can be adopted by the China Railway Express. One is the direct train mode (ie, “point to point”); the other is the consolidation mode, which will be described in detail below.

3.1. The direct train mode

With the development of Chongqing’s “Yuxin’ ou”, the direct train mode has gradually been applied by other cities. Currently, “Yuxin’ ou” (from Chongqing to Duisburg), “Zhengxin’ ou” (from Zhengzhou to Hamburg), “Rongxin’ ou” (from Chengdu to Rhodes), “Yixin’ ou” (from Yiwu to Madrid) and others are operated by this mode.

Currently, China Railway Express is mainly taking the direct train organization (“point to point”). That is, a domestic city is set as the begin-terminal, and open the international container direct trains between this city and a city of Europe.

3.2. The consolidation mode

In order to solve these above problems about China Railway Express, in April 2016, the representatives of various operation companies signed a document in Urumqi, and named it “‘One Belt and One Road’ China Railway Express Union Declaration”. The document pointed out that Urumqi would build a logistic consolidation center (that is, marshalling yard for Express trains) of westward China Railway Express, consequently organize and marshal container trains in the logistic consolidation center. Therefore, a new mode is proposed, we call it the consolidation mode.

The consolidation mode is proposed on the basis of the direct train mode. That is, firstly, the goods will be carried by the domestic train to the consolidation center, and be assembled according to the end-terminal of each shipment. Then, the different end-terminal goods will be transported from the assembly center to foreign end-terminals by international container trains.

4. Comparative analysis of the two modes of transportation organization

4.1. The mechanism of the two modes

In the direct train mode (point-to-point), the container train runs from a single begin-terminal to a single end-terminal. Because of the influence of a single begin-terminal and a single end-terminal, the type and quantity of goods are very small, and the waiting time of goods is very long, and the service frequency is very low. But the direct train mode still has the advantages of short transportation time and high efficiency. Therefore, the direct train mode is more suitable when the supply of goods is sufficient.

On the contrary, the consolidation mode can make a small amount of goods from different sources to be assembled into a batch of goods, and reduce the waiting time of goods at the consolidation center and begin-terminal. Therefore, this mode can increase the load rate, reduce train costs per transported ton, increase the service frequency of international container trains, and enhance the competitiveness of the China Railway Express. However, the goods in the consolidation center need to carry out the additional exchange operations and the costs.

4.2. The advantages and disadvantages of the two modes

Comparing the above two modes of transportation organization, it can be found that the consolidation mode can attract more cargoes and promote the normal operation of the train; the direct train mode (point-to-point) has the advantages of short transportation time and high efficiency. At the same time, both modes also contain their own disadvantages. The detailed advantages and disadvantages of the two modes of transportation organization are shown in Table 1 below.

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Table 1. The advantages and disadvantages of the two modes.

| Schemes          | Advantages                                                                                                                                   | Disadvantages                                                                                      |
|------------------|----------------------------------------------------------------Adam M. Liao et al. 2018%0058%0058%0058%0058%0058%0058%0058%0058%0058%0058%0058%0058%0058%0058%0058%0058%0058%0058%0058%0058%0058%0058%0058| The goods need to be loaded and unloaded again at the consolidation center, adding additional loading and unloading costs;  
| The consolidation mode | • Increase the frequency of express train, reduce the waiting time for cargo assembly, and improve the competitiveness of the China Railway Express;  
|                     | • To attract more sources of goods, one origin can send goods to different destinations abroad;  
|                     | • Reduce the fix costs of the train, ease the pressure on government subsidies, and the scale operation in the consolidation mode can effectively reduce costs;  
|                     | • Eliminate the vicious competition between various operation companies by the integration of resources. | The goods need to be assembled again in the consolidation center, which may extend the overall transit time. |
| The direct train mode | • The overall transportation time of the train is short, and its transportation efficiency is greatly high;  
|                     | • This mode is more attractive for high value-added goods or for goods with shorter delivery times, especially for IT equipment and electronics;  
|                     | • In the case of sufficient cargo volume, this mode can save the cost of container loading and unloading operations caused by reloading in the consolidation center and reduce the overall transportation cost. | The type and quantity of goods are very small, and the waiting time of goods is very long, and the service frequency has been maintained at a low level;  
|                     |                                                                                                                                          | • If there are goods destined for other end-terminals, the goods must be transported to other begin-terminals. |

5. Conclusion

On the basis of reading a number of research literatures on the China Railway Express, we did the following works.

First, we reviewed the current research and summarized the main research directions. Next, we respectively described the two modes of outbound transportation organization, and further analyzed the advantages and disadvantages of the two modes. In this study, we concluded that the two modes have both advantages and inevitable disadvantages. In the future, in order to improve the transport efficiency of the China Railway Express, the operators of the China Railway Express should apply different modes according to different supply structure of goods. Another potential research direction is adopting big data and computer technology to solve the problem of how to apply the most suitable mode according to different cargo supply structures.

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