Research on the scheduling of the business mode based on the network freight platform

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Abstract. From vehicle carriers to network freight operators, more and more mature enterprises invest into logistics freight. As the key object of the development of logistics and transportation industry at the present stage, multimodal transportation has natural advantages compared with a single road transportation. The article analyzes the network freight operator model. It expounds the business content of network freight platform, discusses the competitive cooperation between multiple network freight operators, analyzes the single transportation mode of network freight operators, obtains the phenomenon of low transportation efficiency and the scheduling of urban and cross-regional types.

1. Introduction

In recent years, with the continuous penetration of Internet technology in all walks of life, a large number of Internet technology has been integrated into logistics and freight, and a number of enterprises based on Internet information technology, integrate social information resources and serve carriers and shipper. In 2016, the General Office of the Ministry of Transport issued the Opinions on Promoting Pilot Reform and Accelerating the Innovative Development of Logistics without Vehicle Carrier. In the transformation of transportation mode, multimodal transportation with multiple transportation modes is the main transformation direction of freight at the present stage. According to the research, multimodal transport can improve the transport efficiency by about 30%, reduce the cargo loss by about 10%, reduce the transportation cost by about 20%, and reduce the highway traffic congestion by more than 50% by [2]. As an important means to accelerate the efficiency of logistics circulation, multimodal transportation has been supported by various national strategic plans.

From vehicle carriers to network freight operators, more and more mature enterprises invest in transportation, basically a single road transport. In order to solve the cost, energy consumption and other problems brought by a single mode of transportation, the existing available resources are integrated through the online freight platform, based on the multimodal transport scheduling of the required freight consignment. Maximize the economic cost and time cost of transportation, and maximize the profits are obtained by freight operators.

2. Analysis of the operation mode of the network freight platform

The network freight platform is mainly information resource sorting, which uses the information difference between the actual carrier and the actual shipper to earn the transportation price difference between the two. The current operation mode of China's network freight platform is shown in Figure 1.
Network freight can mainly be divided into three operation modes, namely, network freight + e-commerce, network freight + park base, network freight + multimodal transport mode.

2.1. "Network Freight + e-commerce" mode
E-commerce enterprises have certain advantages in the supply of goods, which can take advantage to integrate the scattered transport capacity in the society, build a third-party logistics service platform, and provide third-party comprehensive logistics services for the majority of social consumers. The main advantages and characteristics of this kind of logistics mode are the large frequency of freight needs, small batch, wide range, strong advantages of goods, can attract more capacity resources, and can achieve the efficient matching of the resources of the whole chain.

2.2. "Network Freight + Park Base" mode
This operation mode refers to the logistics information service platform built by the logistics park operator or the logistics transportation hub, providing a one-stop and systematic solution for enterprises and operators with cargo transportation needs, and undertaking the transportation organization work in the process of goods transportation. The mode of "Network Freight + Park Base" is characterized by that the park base forms the physical network layout in the logistics node cities, sharing information between the logistics bases, and integrating the scattered resources in the society in a wider scope. And the network freight platform relies on the park base to provide integrated value-added freight services.

2.3. "Network Freight + multimodal transport" mode
The operation mode is the network freight platform to integrate the logistics resources according to the economic application characteristics of various logistics technology and its comparative advantages, and to provide integrated combined transport services for the freight owners. The model has a long industrial development chain and enterprises can make effective use of various transportation resources in the market to effectively avoid resource waste, but at the same time, the management of the mode is relatively complex, difficult to coordinate, and the enterprise operation risk is also higher.
3. Analysis of the multimodal transport mode of the network freight operators

3.1. Single transportation mode of network freight operators

At the present stage, the network freight operators mainly operate on the road transport of goods, and few enterprises develop the railway transport and waterway transport market. Enterprises in the early stage of the development of vehicle-free carrier, the society has low awareness of the carrier, limited information channels, so enterprises can accept orders with the characteristics of less freight, near transportation distance, plus road transportation is a simple way of transportation, most vehicle-free carriers will choose a single way of road transportation for goods transportation. Each mode of transportation has its own transportation economic radius. Once the transportation exceeds this distance, it will greatly increase the cost, lose the market competitiveness, and lead to the losses of enterprises and products. Through comparison, it is seen that road transportation has unique advantages in short-distance transportation, but with the increasing transportation distance, railway transportation and waterway transportation are more advantageous, especially in long-distance transportation. The three transport modes are shown in Table 1

| Mode of Transportation | Advantage | Disadvantage | Applicable | The radius of |
|------------------------|-----------|--------------|------------|--------------|
| Road transport         | Flexible 2 | High transport cost | Close distance independent transport | The mode of transportation |
|                       | Small project investment | High transportation energy consumption | Supplement and connect other 100-300km |
|                       | Easy operation | High transportation cost | |

With the transformation of the carrier into network freight operator, in the forefront of the network freight operator industry, has had the development of network freight multimodal transport, but still all with the road transportation development network freight, did not seek to change in the established mode, so developing insurance, but because of its expanding business scope, a single road transportation will be unable to meet the capacity demand, leaving the top level of the industry

3.2. Multimodal transport scheme of network freight operator

Multimodal transport is a complex transportation process that requires the carrier to have the overall judgment ability, and to be able to choose a reasonable mode of transportation and a scientific transportation path. Network freight operators formulate multimodal transport plans through the integration of logistics information resources on the network freight platform. The scheme mainly includes: relevant information of the consignor, the consignee, transportation mode selection of each route, all paths of goods, and relevant information of the transit distribution center. The multimodal transport scheme for a network freight operator is shown in Table 2
Table 2 Multimodal transport scheme of a network freight operator

| Delivery point | Mode of transportation | Transfer center | Mode of transportation | Receiving point |
|----------------|------------------------|-----------------|------------------------|-----------------|
| Qingdao        | The railway            | Yantai          | Waterway               | Dalian          | Yingkou road   |

From the table above, the network freight platform can obtain the online freight platform calculation, and then issues the transportation task to the actual carrier, that is, the multimodal transport operator receives the delivery request of the actual shipper through the platform. According to the plan, the goods went through two ways of transportation transformation, the goods were initially transported from Qingdao to Yantai, and then transferred to waterway transportation, from Yantai to Dalian, and finally transferred to highway transportation, delivered to the Yingkou receiving point, to complete the task of multimodal transport.

3.3. Analysis of multiple factors hindering multiple types

(1) Lack of the construction of multimodal transportation regulations
Although multimodal transport has developed in recent years, China has not issued special regulations on multimodal transport. This allows possible differentiation between regions and regions, hindering the development of [5]

(2) Infrastructure and technology
China's small-scale logistics private enterprises have natural deficiencies in infrastructure and infrastructure equipment, which directly hinders the comprehensive transformation of third-party logistics to the multimodal transport system.

(3) Enterprise Information Technology lags behind
The backward transmission of information technology leads to the untimely transmission of information from regional customs, departments, departments and transportation links, and it is difficult for information to realize resource sharing.

(4) Improper connection between transport
The process of multimodal transport is mainly to arrange the mode of transportation and planning the transportation route. Enterprises should consider how to solve the problems of unloading, loading, transit and other storage of different modes of transportation.

Although there are many factors that hinder the multimodal transport of the network freight operators, after several years of the development stage of the vehicle-free carrier, a small number of enterprises have begun to study the multimodal transport of the network freight.

4. Analysis of network freight operators

4.1. Urban multimodal transport scheduling problem based on the resource advantages of the network platform

(1) Network freight transport platform resource integration
The main service business of the network freight platform is the integration of the relevant logistics information resources, and the logistics informatization is the top priority in the development of the logistics industry, and the efficient development and utilization of the logistics information data resources determines the development of the logistics informatization. The urban multimodal transport scheduling based on the network freight platform is in line with the current basic logistics needs of China's e-commerce express delivery, and can respond to the development direction of the market and customer-oriented modern logistics through reasonable resource allocation. At present, how to
effectively improve the ability and quality of urban terminal logistics distribution service has become an important problem to be solved.

(2) scheduling of urban multimodal transport

Urban multimodal transport scheduling based on network freight platform, using the advantages of network freight platform integration resources, the urban multimodal scheduling analysis, essentially belongs to vehicle scheduling, such problems can be seen as: in the whole distribution system, including the port, distribution center and a certain number of customer points, the distribution center equipped with several distribution vehicles, under the given constraints, planning reasonable vehicle distribution path, bulk goods to the port to the distribution center, the distribution center to the city terminal also needs reasonable planning. Schematic diagram of urban multimodal transport dispatching problem based on network freight platform is shown in Figure 2:

![Figure 2 Schematic diagram of urban multimodal transport dispatching problem](image)

4.2. Cross-regional multimodal transport scheduling problems

Because multimodal transport includes waterway transport and railway transport, these two kinds of transportation have the ability of long-distance transportation, and long-distance transportation pursues the pursuit of timeliness and time cost, while long-distance transportation pays attention to transportation cost, and does not deliberately pursue speed. The characteristics of large waterway transportation volume and slow speed makes it more suitable for long-distance transportation. Long distance transport of freight is usually cross-regional, and since waterway or rail transport is unable to achieve "door" to "door" cargo transport, the "door" to "door" step needs to be completed by road transport.

The scheduling problem of multi-regional multimodal transport transportation based on the network freight platform can be regarded as: there is logistics traffic between the two regions, transportation between regions is long-distance transportation, and transportation inside the region is short-distance transportation. Long distance transportation is completed by waterway or rail, and then by short distance within the area after loading and unloading. The schematic diagram of the cross-regional multimodal transport dispatching problem based on the network freight platform is shown in Figure 3

![Figure 3 Schematic diagram of cross-regional multimodal transport dispatching problem](image)
5. Conclusion
Through the above analysis a preliminary conclusion can be formed: based on the ability of the network freight platform to integrate resources, in the organization and transportation scheme, adopt the multimodal transportation mode, reasonably choose the transportation mode, optimize the final transportation path, and enable the network freight operators to minimize the economic cost required for transportation in the operation process, so as to maximize the profits of the network freight operators. With the help of the data sharing mode, develop multimodal transport dispatching and transportation under the network freight platform, provide scientific decision basis for network freight operators with a certain scale, and better reflect the superiority of network freight as a new logistics industry.

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