Study on Optimal Loading of Zero Load Cargo

Tingpeng Chen¹, Huiwen Fan¹, Xingzhen Zhang¹, Zhenhui Li¹ and Shibo Hu¹

¹Logistics Department, Shandong Jiaotong University, Jinan, Shandong Province, 250357, China

Abstract. In recent years, thanks to the transformation and upgrading of domestic consumption and the continuous improvement of logistics network, the total freight volume of China's part-load logistics market is also increasing, among which urban logistics network plays an important role in part-load logistics enterprises. Reasonable and perfect urban network is helpful to reduce the total cost of market logistics and improve distribution efficiency. This paper introduces the problems existing in part-load logistics, studies the urban logistics model of part-load logistics enterprises, introduces three ways of part-load transportation, and analyzes the urban logistics model of part-load logistics enterprises. At the end of this paper, the above contents are briefly summarized.

1 Introduction

The rapid development of economy has brought new development opportunities for the logistics industry, and the space for the transportation business to enter the market is huge. The share and proportion of part-load transportation cost in the operation cost of traditional logistics is the largest, and its transportation cost is directly related to its vehicle use and stowage. The volume and weight change greatly, which also causes some complexity and difficulty for vehicle stowage. To optimize the vehicle stowage mode, it is necessary to carry out effective stowage of the transport vehicle, so that the vehicle can be close to full load as far as possible, and the transportation cost can be effectively reduced by reducing the number of transport vehicles. It has very important guiding significance in practical application. In today's attention to scientific and technological innovation, efficiency has become the goal of logistics enterprises. At present, in the study of cargo stowage problem, scholars design corresponding constraints, establish mathematical model and solve the problem by design algorithm. Considering the stowage problem of part-load goods will study and analyze more practical constraints that enterprises should encounter in the course of stowage. This study is closer to the actual situation of company cargo stowage, and can provide some ideas for scholars. In the process of problem research and analysis, we can provide more solutions such practical problems.

In view of the known load of goods, compared with the traditional manual experience allocation, how much cost can be saved by using the algorithm, how to improve the loading efficiency quickly and effectively, and how to use the capacity reasonably. This is an important problem for each logistics enterprise that is undertaking the distribution of load. If the contents of this paper and its research results can be applied to the practice of enterprises, it will greatly improve the production and work efficiency of small and medium-sized enterprises. Thus directly or indirectly to small and medium-sized enterprises and the sustainable and healthy development of the national economy has a positive impact.

2 Problems in part-load logistics

There are many factors to be considered in the process of freight transportation, so there are some problems to be solved.

2.1 Absence of industry theory

Lack of professional theoretical support has always been a barrier to part-load logistics. At the moment of the rise of logistics industry, the lack of theoretical knowledge and systematic research makes enterprises not fully aware of the logistics market, then affect the enterprise to the logistics overall process control, low efficiency and other problems. How to effectively improve the understanding of enterprise groups is an urgent problem. Many enterprises have the advantages of logistics network and wide area, but because of the lack of effective contact between line and line and the lack of coordination of different logistics lines, the logistics profit is reduced,. Increased operating costs and other situations, to a large extent limited the vertical development of the logistics industry.

2.2 Unreasonable stowage of goods

Reasonable cargo stowage mode can greatly reduce transportation costs, thus helping enterprises to increase profits. In the traditional stowage process, the overall work of warehouse managers is relatively large, including the distribution of goods and the loading of goods.

^{*} Corresponding author: 2601416659@qq.com

[©] The Authors, published by EDP Sciences. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (http://creativecommons.org/licenses/by/4.0/).

Through this method of manual estimation and assembly, the overall stowage scheme is usually lacking, which leads to the repeated loading and unloading of goods.

2.3 Unstable flow of goods

Part-load logistics customers are mostly small and medium-sized companies or individual retail or individual retail investors, which leads to the uncertainty of logistics, such as unable to know the number of detailed goods, unable to determine the specific delivery time, the destination will also appear certain changes, resulting in the process of logistics instability. Secondly, affected by seasonal factors and policy factors, the part-load logistics industry can not accurately predict the flow of goods, whether small and medium-sized logistics enterprises or large logistics enterprises will face the same problem of instability of the flow of goods.



Fig. 3. Truck, cargo, by car



Fig. 5. Third party logistics model

Join

3 Mode of transport for part-load logistics enterprises

The logistics network composed of its network and route has strong complexity and the business process is complicated. Therefore, it is necessary to adopt reasonable network layout form and cargo transportation process to ensure the smooth development of logistics business. Most part-load logistics enterprises will use fixed partload freight bus to transport, that is, set up fixed operating lines and vehicles, fixed-point fixed-time departure for

Join

transportation. There are three main types of stationary part-load freight buses:

Join

3.1 Direct shuttle bus

The direct part-load freight bus refers to the part-load logistics enterprise sorting all the goods collected by the business department in the service area of the city distribution center, and loading the short distance and the same destination goods into a whole vehicle. Transport directly to the destination business department, as shown in figure 1.

3.2 Transit part-load freight shuttle

Transit freight shuttle means that the goods collected by the business department are sent in the same direction, but the goods collected by the business department are loaded into the fixed-point fixed-time vehicles and transported to the urban distribution center. the same car. The mode of operation is shown in figure 2. Generally speaking, the transfer type of goods in the zero-load logistics business accounts for the largest proportion.

3.3 Truck, cargo, by road

The freight shuttle along the way refers to the form in which the logistics enterprise distributes the goods collected by the business department to the same route. But different destinations (usually loading this type of goods at the rear of the truck), as planned in the city distribution center along the way to load and unload goods and continue to transport. Its mode of operation is shown in figure 3

4 Analysis on Urban Logistics Pattern of Zero-load Logistics Enterprises

From the development experience of urban logistics at home and abroad, the urban logistics model of part-load logistics enterprises can be divided into three modes: selfowned logistics, third party logistics and crowdsourcing logistics.

4.1 Self-owned logistics model

The self-owned logistics model refers to the part-load logistics enterprises through the self-built logistics system, including their own vehicles, loading and unloading equipment, transport personnel, logistics infrastructure and logistics information system, etc., using the business department to provide customers with delivery, delivery, delivery and delivery of goods as one of the services. Compared with the third party logistics, self-owned logistics can reduce the service time of delivery and ensure the operation efficiency of urban logistics. The FedEx and UPS of the global zero-load express giant, for example, and Debang, a large part-load logistics enterprise in China, have adopted the self-run logistics model. These enterprises usually have more fixed customers and large freight volume. The scale effect can bring lower cost and obtain more profit. The part-load logistics enterprises which adopt the self-owned logistics mode will direct each logistics node (business department and city distribution center, etc.) and each transportation line (customerdepartment, business business department-city distribution center) by direct operation.

4.2 Third party logistics model

The third party logistics mode refers to the enterprises with weak ability to fulfill logistics orders to provide urban logistics services by other logistics enterprises, and the two sides establish cooperative relations by signing contracts. For most of the small-load enterprises with less investment in logistics infrastructure and less volume, the use of third-party logistics enterprises to provide transportation services can effectively reduce costs compared with self-owned logistics, which is a good choice. However, due to the low control ability of thirdparty logistics enterprises, it is easy to be restricted. Usually, most part-load logistics enterprises outsource these branch transportation networks to other franchisees, that is, third-party logistics enterprises. Less part-load logistics enterprises will outsource the trunk transportation network of urban distribution center-city distribution center.

5 Conclusions

This paper expounds the problems of part-load logistics, understands the shortcomings and shortcomings of partload transportation, and studies the urban logistics mode of part-load logistics enterprises, and introduces three ways of part-load transportation, including direct part-load freight bus, transit part-load freight bus and along the way freight bus. And the city logistics model of part-load logistics enterprises is analyzed, including three modes, namely, self-owned logistics model, third party logistics model and crowdsourcing logistics model. Under the problems of part-load logistics, it is very important to optimize and adjust the urban logistics network in time, reduce its operating cost and increase its service experience, which has also become one of the core competitiveness of part-load logistics enterprises.

References

- 1. Yuhan Feng. (2017) An empirical study on the willingness and behavior of crowdsourcing logistics distribution. Jilin University.
- 2. Xu Yang. (2015) Practice and thinking on the Development of Railway Zero Fast Logistics. Railway Transportation and economy.
- 3. Fei Guan. (2013) Fuzzy multi-objective logistics distribution center location model. China Management Science.
- Shengjie Zhu. (2015) Study on site selection of Highway part-load Business Department based on GIS. Northeast Agricultural University.
- 5. Holleg. (2011) Logistics operations research. Beijing: people's Communications Press.