The Modeling of Milk-run Vehicle Routing Problem Based on Improved C-W Algorithm that Joined Time Window

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Abstract

In recent years, reducing logistics costs becomes an important area for manufacture companies in creating profits. And reasonable vehicle routing planning is the key of the logistics operation management. As a new inbound logistics model, the milk-run of auto parts has attracted wide attention. However, this effective inbound logistics mode has some problems in practice. So it is worth to ponder for choosing the right milk-run routes when auto companies try to use the mode. The paper takes the case 12 of Anji cup Logistics Competition as the background, first describes relevant content about milk-run route, milk-run route is the circle pickup route. Then it puts forward the problems in the process of circulation pickup by analyzing the pick-up routes of auto parts in Anji-company. With the aid of the improved C-W algorithm, and build a mathematical model on how to optimize the milk-run routes based on time window constraint, finally solves the problems by using C++ programs, which makes the 8 pickup route schemes to develop the program. It not only proposes solutions to the existence problems of Anji-company, but also provides ideas in the study of optimization milk-run routes for another logistics companies, what’s more, it has a strong significant meaning.

Keywords: milk-run, mathematical model, time window constraint, C-W algorithm, C++
1. The background of case 12 in Anji cup Logistics Competition

1.1. Milk-run workflow

The whole closed-loop milk-run transportation system is made up by the manufacturer, logistics management, carriers, warehouses or distribution center together. If the whole logistics activities are performed only by Anji logistics company, then transport system will be performed by manufacturers, Anji-company, suppliers and warehouse or distribution center collectively. The process of Milk-run operations starts when the truck driver has got the route reports (route list, parts list and empty container sheet). Then the truck needs to be driven to the operation of the first suppliers. The process of a cycle pickup is shown in figure 1:

![Flowchart of Milk-run workflow](image)

Figure 1. The process of a cycle pickup
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