

Vehicle routing within the food industry - choosing the right path

By Sofia Larsson & Sofia Ottosson (2024)

Vehicle routing is complex but can have a substantial impact on a company's profitability. So, how can routes be configured to maximize truckload utilization while still meeting customer expectations?

How should companies balance costs and customer service in their distribution operations? Should cost efficiency be prioritized? Or should customer service be the primary focus? This tradeoff between costs and customer service is considered to be one of the most important challenges for companies. In recent years, there has been a shift in attitudes towards distribution. Distribution used to be an operational necessity, which companies focused on being as cost efficient as possible. More and more, distribution has the potential of providing a competitive advantage for the company, contributing to a positive customer experience. For wholesalers, distribution plays an even more important role as it can impact up to 35% of the revenue stream. With this new attitude, there is a greater need for planning and control of distribution activities, which route planning and optimization is an example of.

Planning distribution routes is a complex task as there are many aspects to consider, such as special customer requirements, the capacity of the fleet, and weight and volume restrictions of the vehicles. Including all aspects in a mathematical model implies substantial computational difficulties. Planning distribution routes within the food industry makes the problem even more complex, as there are various product characteristics to consider such as temperature requirements, shelf life and fragility. This thesis tries to simplify the problem by approaching it from a business

perspective rather than strict mathematical optimization.

This thesis was written in collaboration with a case company. The case company is a leading food wholesaler in Sweden and they are planning to centralize all of the inventory into one central warehouse, creating new conditions for their distribution. Additionally, the case company is experiencing low truckload utilization of their inhouse distribution vehicles. Therefore, they want to reconfigure their distribution routes in order to increase the truckload utilization of their in-house vehicles. In this context, truckload utilization refers to how well a truck's capacity is utilized relative to its maximum capacity.

An analytical framework was developed and applied to the case company. By the help of the analytical framework, the current distribution setup was analyzed and important factors to consider in the route configuration were identified. The new distribution routes were then configured and the current setup was compared to the proposed solution. The result shows that the average truckload utilization could be increased by 42% with the new route configuration. The analytical framework produced can be used by other companies wanting to reconfigure routes while keeping a clear focus on their business and customers. Additionally, it can help future researchers analyze this topic.

This popular scientific article is derived from the master thesis *Reconfiguring distribution routes to increase vehicle efficiency after inventory centralization*, written by Sofia Larsson and Sofia Ottosson (2024).