Fleet sizing and composition in grocery retailing

Sara Martins*†[1], Ayse Akbalik[2], and Christophe Rapine[2]

[1]INESC TEC and Faculty of Engineering, Universidade do Porto – Portugal
[2]Université de Lorraine – LCOMS, Université de Lorraine – France

Abstract

In grocery retailing, due to the management of products with distinct temperature requirements (ambient, chilled, frozen), different distribution strategies can be performed depending on the available types of vehicles, namely single compartment vehicles (SCV) or multi-compartment vehicles (MCV). Each type imposes different costs, but also distinct limitations and impacts for both product quality and environment. For these reasons, grocery retailers need to carefully select the types of vehicles to use to perform the distribution of the products. Single compartment vehicles can only transport one type of product at a time, while multi-compartment vehicles allow for joint distribution of different product types. However, the costs associated with each type of vehicle are very different and trade-offs between costs and operational requirements need to be analyzed to select the best fleet size and composition. In addition, retail sites and products have different time windows associated and, usually, site-dependency restrictions which limit the distribution planning. Although there is literature on fleet sizing, none of them portrays these challenges found in grocery retail distribution. Therefore, this work aims to analyze how to define the best distribution fleet in grocery retailing, considering different types of products and heterogeneous vehicles, including compartment-based vehicles.

Keywords: Fleet sizing, VRP, multi, compartment, multi, commodity, heterogeneous vehicles

*Speaker
†Corresponding author: sara.martins@fe.up.pt