Albina Galiullina
Demand Management for Inventory Imbalance Problem

One of the major challenges in the operations of shared items is the inventory imbalance across stations. A common approach to tackle this problem is transshipping items from the stations with an excess inventory to the stations that experience a shortage of inventory. Since these transshipments incur considerable transportation costs, in this work, we examine how the re-balance costs can be reduced by using demand management tools. For instance, the operator of such a system may try to redistribute the demand and supply across stations by assigning users to specific stations at a certain cost. The objective is to minimize the sum of the transshipment and the assignment costs. We model the problem as a mixed-integer program and develop a solution heuristic based on geographical decomposition and a rolling horizon framework. The proposed model is tested on real-life data in operations of shared items within a horticultural industry. The experiments demonstrate the potential benefits of applying the assignment and transshipment in the re-balance problem compared to using transshipments only.