Tactical Supply Chain Distribution Planning In The Telecommunications Service Industry

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Abstract

Supply chains are ubiquitous across industries and a considerable effort has been invested in supply chain management techniques over the last two decades. In equipment-intensive service industries, it often involves repair operations. In this context, tactical inventory planning is concerned with optimally planning supplies and repairs based on demand forecasts and in face of conflicting business objectives. It is based on a case study in the telecommunications sector where large quantities and varieties of spare parts are required for service maintenance and repair tasks at customer premises or company exchanges. Specifically, we consider a multi-echelon spare parts supply chain and tackle the problem of determining an optimal stock distribution plan given a demand forecast. We propose a mixed integer programming and a metaheuristic approach to this problem. The model is open to a variety of network topologies, site functions and transfer policies. It also accommodates multiple objectives by the means of a weighted cost function. We report experiments on pseudo-random instances designed to evaluate plan quality and impact of cost weightings. In particular, we show how appropriate weightings allow to emulate common planning strategies (e.g., just-in-time replenishment, minimal repair). We also assess plan quality and system performance against different classes of pseudo-random instances featuring different volume and distribution of stock and demand.

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