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ADP Approach to Evaluate the Blood Supply Network of Ontario

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Abstract : This paper presents the application of uncapacitated facility location problems (UFLP) and 1-median problems to support decision making in blood supply chain networks. A plethora of factors make blood supply-chain networks a complex, yet vital problem for the regional blood bank. These factors are rapidly increasing demand; criticality of the product; strict storage and handling requirements; and the vastness of the theater of operations. As in the UFLP, facilities can be opened at any of m predefined locations with given fixed costs. Clients have to be allocated to the open facilities. In classical location models, the allocation cost is the distance between a client and an open facility. In this model, the costs are the allocation cost, transportation costs, and inventory costs. In order to address this problem the median algorithm is used to analyze inventory, evaluate supply chain status, monitor performance metrics at different levels of granularity, and detect potential problems and opportunities for improvement. The Euclidean distance data for some Ontario cities (demand nodes) are used to test the developed algorithm. Sitation software, lagrangian relaxation algorithm, and branch and bound heuristics are used to solve this model. Computational experiments confirm the efficiency of the proposed approach. Compared to the existing modeling and solution methods, the median algorithm approach not only provides a more general modeling framework but also leads to efficient solution times in general.

Keywords : approximate dynamic programming, facility location, perishable product, inventory model, blood platelet, P-median problem
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