Abstract

The present work is an attempt to design a reverse logistics (RL) network for an e-commerce firm based on one of the most frequently returned items namely fashion goods. The problem essentially revolves around the trade-off between cost and responsiveness in designing an RL network for an e-commerce firm. If returns are sent back to the vendors through faster mode of communication in frequent interval for improving responsiveness, the cost of transportation becomes prohibitively high although inventory carrying cost diminishes. On the contrary, if the returns are sent to the vendors in batch mode, cost of transportation would decrease due to economies of scale achieved in transportation. However, this would result in higher inventory carrying cost. We have considered several big residential complexes within a large metropolitan city in India and treated the same as customer indexes from which the returns originate. Several candidate nodes have been identified as initial collection centres (ICCs) in which the returns from the customer indexes are initially collected and stored for some time before being sent to the final warehouses. There are three warehouses in three different cities. We have ensured that one customer index would be assigned to only one ICC. The decision variables of the above problem include the selection of ICCs, the assignment of the customer indexes to the ICCs and finally the volume of returns to be shipped from the ICCs to all three warehouses. We have formulated the above problem as a mixed integer linear programming (MILP) problem with a view to minimizing the total cost of the network. We have carried out sensitivity analyses on the relevant parameters and provided rich managerial insights.

Keywords: Reverse Logistics, E-Commerce firm, Cost-Responsiveness trade-off, Mixed Integer Linear Programming.

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