

Developing heuristic models to evaluate logistic network of 3rd party logistic providers

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Third-Party Logistics Providers (3PL) face a great pressure in order to meet its manufacturers' and customers' needs. Meeting the demands of manufacturers and customers' (agents) while optimizing the available resources is one of the main problems faced by the managers of 3rd party logistics companies. Previous researchers have developed various models relevant to optimizing logistic networks but they have not sufficiently addressed how to optimize logistic network while utilizing vehicle capacities, volume of goods and distance while minimizing the cost.

The researchers consider multiple carriers and single vehicle types available to cover a set of pickup and delivery orders in the research. This research addresses the problems in the logistic network on how to transport goods from plants to central warehouse and retailers. The researchers present two different scenarios to identify and assess different configurations to design logistics networks. These overall logistics cost minimization frameworks support 2 scenarios based on number of plants, distance from destinations of deliveries and volume of goods and vehicle capacity. In scenario 1, the researchers consider how to transport goods from many plants to single central warehouse when there is no demand from customers. This enables the logistics managers to decide the route of the vehicles i.e. whether the vehicles should go to single plant or more plants to pick up the order by consolidating the same vehicle. In scenario 2, it addresses how the goods should be transported from many plants to many warehouses when there is a demand for the goods from customers. In both cases the capacities of vehicles and the capacities of the good to be transported is taken into consideration to minimize the transportation cost.

A heuristic approach is used to develop the two different models to evaluate the proposed configurations. The standard column generation procedure is applied to solve the linear relaxation. When the result is compared with the existing process, it is proven that the companies can save more than 14% of the logistics cost by modelling the first configuration which was depicted using Arena simulation software. It is also shown that the approaches are capable of generating near-optimal solutions. The outcome of this research ease the selecting process of most appropriate logistic network configuration while optimizing logistic routes and utilizing vehicle capacities efficiently.

Keywords: Logistics network, Network optimization, Third-Party logistics, Logistics providers