

Network Design Optimization for Retail Distribution Supply Chain Considering Capacities of Distribution Centers under Disruptions

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Abstract - Distribution in the retail supply chain (SC) is a core function of taking products to the customer. Supply chain network design (SCND) plays a major role in retail distribution in determining the best ways to locate facilities in the SCs. 100% availability of facilities can be identified as the most common limitation of much research conducted in a similar context due to the vulnerability of facing disruptions. Disruptions in SC are considered differently in research and numerous strategies are applied. However, direct shipping from suppliers to retailers has not much been focused on by previous studies although it is abundant in practice. This study develops a model for SCND under disruptions considering the direct shipping from suppliers to the retailers in the distribution network considering different levels of disruptions that occurred at distribution centers (DC). Linear programming technique is used in python language to build up suggested optimization model. Results of the model show the optimum distribution networks to use in the different disruption situations such as partial disruptions to the DCs and full DC disruptions that minimize the costs considering direct shipment. Overall, direct shipment can be used to optimize SCND not only under disruptions but also in general conditions with the identification of marginal values in different factors involved. Identification of the costs in DC failures using this method can be used to enhance the resiliency of the DCs according to their importance.

Keywords - optimization, retail distribution networks, supply chain disruptions, supply chain network design