Shared Capacity Routing Problem for Buy-On-line-Pickup-in-Store Order Fulfillment

Rajendra Baraiya and Rohit Kapoor
Operations Management & Quantitative Techniques Department
Indian Institute of Management, Indore
Prabandh-Shikhar, Rau-Pithampur Road, Indore, Madhya Pradesh, India - 453556
f17rajendrab@iimidr.ac.in, rohitk@iimidr.ac.in

Abstract

Buy-online-pickup-in-store (BOPS) is one of the omnichannel retailing models which is getting popularized nowadays (Gallino & Moreno, 2014; Gallino, Moreno, & Stamatopoulos, 2017; Gao & Su, 2016; Glaeser, Fisher, & Su, 2019; Song, Wang, Liu, & Li, 2020). Motivated by complexities of BOPS environment, we propose a generalized model for the order fulfillment in BOPS retailing to minimize the delivery cost of the BOPS orders. A variant of the problem is characterized by Paul, Agatz, and Savelsbergh (2019) and Paul, Agatz, Spliet, and Koster (2019). Typically, the BOPS orders are delivered at the pick-up-points (PUPs), which are generally the traditional retail stores. The customer can order online and pick up the order from specified PUPs. Big retailers like Walmart and Tesco are using the dedicated warehouse for the fulfillment of the online PUP orders (Delaney-Klinger, Boyer, & Frohlich, 2003; Hübner, Kuhn, & Wollenburg, 2016). The context allows that daily two vehicles visit the stores, one for replenishing the store inventory and the second for delivering the PUP orders. The joint planning of both replenishment and PUP routes is difficult due to operational constraints as replenishment routes are well planned in advanced and PUP routes are planned much later because of the shorter lead time of the PUP orders. However, there are possibilities of exploiting the spare vehicle capacity of the replenishment vehicle, by piggyback the PUP orders on it, so that the total delivery cost of PUP orders is minimized.

Keywords
BOPS, Omnichannel, Transportation, Capacity Sharing, Store transfer

References
Biographies

**Rajendra Baraiya** is a PhD student of the Operations Management and Quantitative Techniques department at Indian Institute of Management (IIM) Indore, Madhya Pradesh, India. He earned B.E. in Production Engineering from Government Engineering College, Bhavnagar, Gujarat, India, and a Masters in Production Engineering from Thapar Institute of Engineering and Technology, Patiala, Punjab, India. His research interests are Supply Chain Management, Supply Chain Coordination, Inventory Management, Logistics, and Omni-Channel Retailing. He has published journal and conference papers. He is a member of IEOM, WCTRS, POMS, DSI, EurOMA, The OR Society, ASCM, and IEEE.

**Rohit Kapoor** is a faculty in the Operations Management and Quantitative Techniques area. He is a Fellow of IIM Ahmedabad, India. His research interests are in the areas of Supply Chain Management, Production Planning, Inventory Control, and Network Design. He has good exposure in Mathematical Programming, Optimal Control, Monte-Carlo Simulations, and Meta-Heuristics.