PURDUE UNIVERSITY | Krannert School of Management

Supply Chain & Operations Management Seminar

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Achieving High Individual Service-Levels without Safety Stock? Optimal Rationing Policy of Pooled Resources

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Virtual

Bio

Jiawei Zhang is the Michael Armellino Professor in Business and Professor of Information, Operations, and Management Science at the Stern School of Business, New York University. His primary research interests include business analytics and optimization with applications in supply chain and revenue management. Professor Zhang was a recipient of the INFORMS Optimization Prize for Young Researchers. He received his B.S. in Applied Mathematics and M.S. in Operations Research from Tsinghua University, China, and his PhD in Management Science and Engineering from Stanford University.

Abstract

Resource pooling is a fundamental concept that has many applications in Operations Management for reducing and hedging uncertainty. An important problem in resource pooling is to decide (1) the capacity level of pooled resources in anticipation of random demand of multiple customers and (2) how the capacity should be allocated to fulfill customer demands after demand realization. In this paper, we present a general framework to study this two-stage problem when customers require individual and possibly different service-levels. Our modeling framework generalizes and unifies many existing models in the literature. We propose a simple randomized rationing policy for any fixed feasible capacity level. Our main result is the optimality of this policy for very general service-level constraints, including Type-I and Type-II constraints and beyond. The result follows from a semi-infinite linear programming formulation of the problem and its dual. We also prove optimality of index policies for a large class of problems when the set of feasible fulfilled demands is a polymatroid. This talk is based on a joint work with Jiashuo Jiang and Shixin Wang.