INDUSTRIAL ENGINEERING SEMINAR

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On the Interplay between Location, Inventory, and Transportation Decisions

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Abstract

Although the interaction between facility location and inventory decisions has been recognized as early as 1960s, quantitative research exploring this interaction in the context of supply chain integration is relatively new. Existing work can be broadly categorized as (i) quantitative models that investigate the impact of inventory costs on facility location decisions without explicitly optimizing inventory decisions, i.e., inventory policy or inventory policy parameters, and (ii) quantitative models that are aimed at simultaneous optimization of location and inventory decisions. We propose models that fall into this second category and fill a gap in the literature by investigating the impact of different transportation cost structures. We develop mixed-integer nonlinear models and analyze their structural properties leading to exact expressions for the so-called *implied facility assignment costs* and *imputed per-unit per-mile transportation costs*. These expressions analytically demonstrate the interplay between *strategic* location and *tactical* inventory/transportation decisions in terms of resulting *operational* costs. While both the theory and practice of integrated logistics have recognized the fact that strategic and tactical decisions are interrelated, to the best of our knowledge, our paper is the first to offer closed-form results demonstrating the relationship explicitly.

Biography

Dr. Çetinkaya is Professor and Associate Head of Industrial and Systems Engineering at Texas A&M. She is a department editor for *IIE Transactions*, an associate editor for *Naval Research Logistics*, and she has served on the editorial boards of *Manufacturing and Service Operations Management* and *International Journal of Inventory Research*. She holds a Ph.D. (1996) in Management Science from McMaster University, an MS (1991) in Industrial Engineering from Bilkent University, and a B.S. (1989) in Industrial Engineering from Istanbul Technical University. Çetinkaya's research interests include supply chain management, inventory theory, and applied probability. Her publications appeared in *Management Science*, *Operations Research*, *Production and Operations Management*, *IIE Transactions*, *Naval Research Logistics*, and *Interfaces* among several other reputable refereed journals. Her research and teaching activities have been supported by multiple grants from the US National Science Foundation, as well as by Texas Engineering Education Coordination Board, US Department of Education, and Frito-Lay, Pepsi-Co, and Nokia among other companies. Çetinkaya received an NSF CAREER Award in 2001. In recognition for her scholarly accomplishments, she was named by the IIE the "Outstanding Young Industrial Engineer in Academia in 2003". She has also been named as a "Fellow of the IIE" for professional leadership and outstanding contributions to industrial engineering in 2012.