Dept of Industrial & Systems Engineering, NUS, Singapore

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Dept of Decision Sciences, NUS, Singapore

JOINT SEMINAR

on

Provably Near-Optimal Balancing Policies for Stochastic Inventory Control Models with Lost Sales

Speaker: Mahesh Nagarajan, University of British Columbia, Canada

Date: 23 November 2005 (Wednesday)

Time: 14:00 p.m. to 15:00 p.m.

Venue: EA-06-03, Faculty of Engineering, NUS

Abstract:

In this paper, we describe the first computationally efficient policies for stochastic inventory models
with lost-sales and replenishment lead times that admit worst-case performance guarantees. These models have challenged researchers and practitioners for over 5 decades as very little is known about the structure of the optimal policies, and computing provably good policies seem to be intractable even in very simple settings.

In particular, we introduce dual-balancing policies for lost-sales models that are conceptually similar to dual-balancing policies recently introduced for a broad class of inventory models in which demand is backlogged rather than lost. That is, in each period, we balance two opposing costs: the expected marginal holding costs against the expected marginal lost-sales-cost. Models with lost-sales admit fundamentally different mathematical properties than their counterparts with backlogged demand and are known to be significantly harder. Thus, the worst-case analysis presented in this paper is fundamentally different from the previous analysis of models with backlogged demand. It incorporates several novel ideas that we believe will contribute to the future research on lost-sales models. Specifically, we shall show that the dual-balancing policies for the lost-sales models provide a worst-case performance guarantee of 2 under relatively general demand structures. In particular, the guarantee holds for independent (not necessarily identically distributed) demands and for models with correlated demands such as the AR(1) model and the multiplicative auto regression demand model model. The policies and the worst case guaranteed extend to models with capacity constraints on the size of the order and stochastic lead times.

This is joint work with Retsef Levi, IBM Yorktown and Ganesh Janakiraman, Stern, NYU.

About the Speaker:

Mahesh obtained his Ph.D. in operations research and management at the Marshall of business at the University of Southern California in 2003. Prior to that Mahesh obtained his masters in pure and applied mathematics. His undergraduate degree was from the Indian institute of technology, Bombay. His research interests include stochastic inventory theory, cooperative game theory, optimization and computational game theory.

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