Chapter 12

Risk-Pooling Strategies to Reduce and Hedge Uncertainty[1]

Uncertainty is the bane of operations. No matter in what form—for example, uncertain demand, uncertain supply, or uncertain quality—operational performance never benefits from the presence of uncertainty. Previous chapters have discussed models for coping with uncertainty (e.g., queuing, newsvendor, and order-up-to) and have emphasized the need to quantify uncertainty. Some strategies for reducing and hedging uncertainty have already been suggested: combine servers in a queuing system (Chapter 7); reduce uncertainty by collecting data to ensure that the best demand forecast is always implemented (Chapter 9); establish make-to-order production and invest in reactive capacity to better respond to demand (Chapter 10).

This chapter explores several additional strategies based on the concept of risk pooling. The idea behind risk pooling is to redesign the supply chain, the production process, or the product to either reduce the uncertainty the firm faces or to hedge uncertainty so that the firm is in a better position to mitigate the consequence of uncertainty. Several types of risk pooling are presented (location pooling, virtual pooling, product pooling, lead time pooling, and capacity pooling), but these are just different names to describe the same basic phenomenon. With each strategy, we work through a numerical example to illustrate its effectiveness and to highlight the situations in which the strategy is most appropriate.

12.1   Location Pooling

The newsvendor and the order-up-to inventory models are tools for deciding how much inventory to put at a single location to serve demand. An equally important decision, and one that we have ignored so far, is in how many different locations should the firm store inventory to serve demand. To explain, consider the Medtronic supply chain discussed in Chapter 11. In that supply chain, each sales representative in the field manages a cache of inventory to serve the rep's territory and there is a single distribution center to serve the en-

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[1]Data in this chapter have been disguised to protect confidentiality.