

Preface

Inventory management constitutes an important research area in operations management. The research has mainly focused on the problem of how inventory managers should make their procurement decisions and allocate limited inventory to satisfy customers' demand. Around this central problem, a wide variety of interesting topics have been examined, including the effect of the procurement cost structure on inventory policies, demand learning and forecasting, and lead-time management.

Previous work on lead-time management has primarily focused on the supply side. Supply-side lead-time corresponds to the delay between the time an inventory manager places a replenishment order and the time the replenishment actually arrives. The problem has been considered in a number of contexts, including stochastic lead times, multiple supply sources with different procurement costs and lead times, and multi-echelon, to name a few. There has also recently been an increasing interest in applying the idea of lead-time management to the demand side. Demand-side lead-time can be interpreted as the delivery delay between the time a customer places an order and the time the order arrives. Demand-side lead-time has gained attention in part because firms have begun to realize that customers have heterogeneous delivery-time requirements, and they can exploit this heterogeneity to their advantage by offering multiple delivery-time options to customers. This delivery-time-based differentiation strategy is particularly useful when firms have scarce inventory and face a long replenishment lead-time on the supply side. Although industry practices of such a strategy are abundant, a more rigorous theoretical treatment is still lacking and would be of great practical value to an effective implementation of the strategy.

We develop a modeling framework to analyze the problem of inventory management with alternative delivery times in this book. The general context considered here is that a seller replenishes its inventory in fixed intervals and, between replenishments, allocates the limited inventory to satisfy customers who are both price and delivery-time sensitive. On the demand side, customers have heterogeneous delivery-time requirements and choose either spot or late delivery. This theoretical modeling captures the essence of real-world business practices such

as the delivery-time market segmentation strategy adopted by automobile dealerships in China and many other similar examples. We focus on the seller's optimal inventory replenishment and demand fulfillment policies, and our results provide managerial insights into the merits of flexible delivery-time options. Similar applications such as the group-buying mechanism are also examined. The main mathematical tool used in theoretical analysis is dynamic programming. This book is written for students, researchers, and practitioners in the areas of operations management and industrial engineering who are interested in understanding the rationale of flexible delivery times and designing successful applications.

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