



Manufacturing & Service Operations Management

Publication details, including instructions for authors and subscription information:
<http://pubsonline.informs.org>

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To cite this article:

Hau Lee, (2001) Introduction to Focused Issue: The Use of Information in Managing Supply Chains. Manufacturing & Service Operations Management 3(1):51-52. <https://doi.org/10.1287/msom.3.1.51.9994>

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Introduction to Focused Issue: The Use of Information in Managing Supply Chains

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As information technologies continue to make drastic advancements—many in industry have dubbed the current time as the “information age”—innovative ways for managing a supply chain have also emerged. The developments in advanced enterprise information systems and the Internet have enabled information to be readily accessible to multiple members of a supply chain. The resulting access to accurate, up-to-date information facilitates much more effective supply chain management.

Stimulated by early successes in improving supply-chain performance by sharing demand information across the supply chain by industry, research on this subject has received increasing attention and interest. The objectives of the focused issue on “The Use of Information in Managing Supply Chains” are to illustrate the new ways that companies can use and have used information to operate their supply chains and, hence, illustrate the value of such information sharing.

In Part I of this focused issue, we present three papers that deal with three different aspects of using information to improve supply-chain performance. The paper “Market Segmentation, Advanced Demand Information, and Supply Chain Performance,” by Fangruo Chen, addresses the value of advanced demand information. In the model examined here, some customers are willing to place an order with delayed delivery (which then constitutes advanced demand information) because different customers have different degrees of aversion to order delays. To incent this behavior, the supplier offers price-discount schedules. The focus here is an examination of the costs and benefits of the optimal pricing strategy.

Contribution to Theory and Practice: In practice, advanced-demand information is indeed commonplace

when customers place orders with some future delivery dates. A price discount is one way in which customers can be encouraged to place orders early with a later delivery date. How should such price discounts be given; how should firms make use of the advanced-demand information to optimally manage inventory, and what are the costs and benefits of such a combined strategy of using price discounts to gain advanced-demand information are all questions of great relevance to industry and practitioners. The current paper, therefore, makes a contribution to both the theoretical modeling as well as industry understanding of this important subject.

The second paper, “Utilizing Forecast Band Refinement for Capacitated Production Planning,” by Philip Kaminsky and Jayashankar Swaminathan, addresses the value of forecast improvement over time. Here, information is in the form of any direct or indirect inputs that are used to improve the accuracy of forecasts as time goes on. The forecast accuracy is modeled by forecast bands, which are like confidence intervals on the future demand. The band becomes tighter and tighter as the time of the actual demand approaches, signifying forecast improvement. In the context of a capacitated production system, a trade-off results between the size of the capacity buffers provided and the quality of the forecast band at any given point in time.

Contribution to Theory and Practice: This paper makes a contribution to production planning under uncertainty, first by proving the existence of inventory threshold levels in each period below which the firm should produce and above which it should not; and, second, by providing various heuristics and evaluating their effectiveness analytically and computationally.

Contribution to Practice: This paper is also a contribution to industry practice because many companies use forecast bands as a way to characterize their uncertainty about future demand. These forecast bands are updated as time goes by, when new information about the market or the product is available. As such, the current paper models a very realistic situation, and the results contained in this paper should, therefore, be of great value to practitioners.

The third paper, "Supply Chain Coordination When Demand Is Shelf-Space Dependent," by Yunzeng Wang and Yigal Gerchak, addresses the interrelationship between inventory information and demand. The key premise is that inventory information affects demand. Specifically, at a retail store inventory information is conveyed by the amount of shelf space allocated to the product. The higher the shelf space, the higher the inventory. This amount usually is positively correlated to demand, i.e., as the shelf space increases, the demand rate goes up. Consequently, the determination of the inventory level kept by the re-

tailer, which is directly related to the shelf space, should take into account the demand effect.

However, the shelf-space decision by the retailer may not be optimal to the manufacturer, and may also not be optimal for the supply chain consisting of both the manufacturer and the retailer. Indeed, this paper shows that, in a decentralized supply chain, the manufacturer has to set the appropriate wholesaler price as well as provide a holding-cost subsidy to achieve channel coordination, i.e., so that a system-wide optimum is realized. The model is then extended to the case when there are two retailers.

Contribution to Theory and Practice: This paper contributes to our understanding of incentive-compatibility problems in a two-level supply chain when the sales effects are not strictly exogenous. Instead, the decisions made by members of the chain affect the demand rates. As such, it is a new perspective to the conventional supply-chain problem, and it adds realism to the literature.

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Special Issue Editor