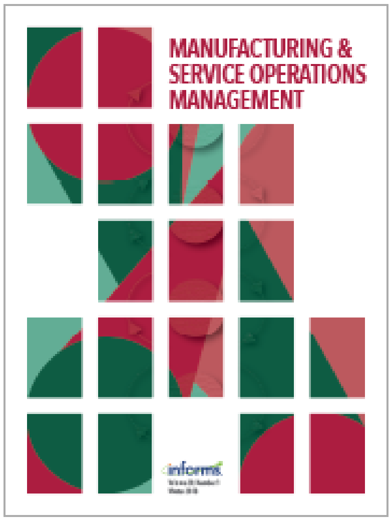

Manufacturing & Service Operations Management

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

In this issue ...

To cite this article:
(2000) In this issue .... Manufacturing & Service Operations Management 2(3):i-ii. https://doi.org/10.1287/msom.2.3.0.12343

In this issue . . .

"In this issue . . .," a regular feature of *Manufacturing & Service Operations Management*, briefly describes each issue's articles and highlights their contributions to theory and to practice.

The first article in this issue, "Congestion and Complexity Costs in a Plant with Fixed Resources that Strives to Make Schedule," by William S. Lovejoy and Kannan Sethuraman, proposes a conceptual model of congestion cost—which arises from increases in volume—and complexity cost—which arises from an increase in variety—in a plant with fixed labor and capital equipment that is expected to process all the jobs released to it in a fixed amount of time.

Contribution to Theory: The literature on complexity and congestion is dominated by time-based logic, i.e., that increasing the volume or variety of a plant's workload without increasing its capacity leads to an increase in throughput time. Lovejoy and Sethuraman propose a quality-based logic. They define capacity as a time/quality pair. This view permits workers and management the opportunity to substitute time for quality by "rushing" jobs. Lovejoy and Sethuraman also tie the shop-floor model to the accounting system and treat accounting reports as partial information regarding the reality on the shop floor.

Contribution to Practice: Competitive pressures and customer expectations to want things "now" often motivate managers to expect a plant to "make schedule" despite increasing the volume and/or variety of products that the plant produces. In this business environment, the time-based view of capacity—that such increases require longer throughput time—fails utterly to provide insight to management. Lovejoy and Sethuraman's analysis suggests that the impact of making schedule will depend on a firm's labor policies and system for quality control, and focuses attention on the important role of the plant information system. For example, the authors demonstrate that unless external failure costs are included in plant reports, management will have an incentive to use less than the optimal amount of overtime, thereby increasing total firm costs.

The principal-agent paradigm, in which a principal (e.g., owner), has a stake in the performance of an operating system but delegates operational control to an agent (e.g., manager), has many natural applications in operations management. However, traditional principal-agent models are static and, hence, of relatively little value in the dynamic environment of many operations settings. Our second paper, "Performance-Based Incentives in a Dynamic Principal-Agent Model," by Erica Plambeck and Stephanos Zenios, embeds the principal-agent paradigm in a Markov Decision Model to develop a *dynamic* principal-agent model. The motivating example is a maintenance problem.

Contribution to Theory: This paper provides a conceptual framework for the examination of operating systems under delegated control. In particular (although the analysis of a dynamic principal-agent model has, until now, been deemed intractable), Plambeck and Zenios introduce assumptions involving the economic nature of the principal-agent relationship that lead to its tractability. Under these assumptions, if the dynamics of operations can be modeled as a Markov process, then Plambeck and Zenios demonstrate that it can be analyzed using dynamic-programming logic. This logic relies on a generalization of Bellman's principle of optimality.

Contribution to Practice: What is the impact of delegation of system performance? The analysis here demonstrates that delegation reduces system flexibility and profitability. Can pay-for-performance schemes enhance performance? Plambeck and Zenios show that profitability can be improved with a carefully designed scheme.

Delivering high-quality service is central to competing in service organizations. However, in the real world, high quality must be achieved while controlling for costs. "A Robust Optimization Approach for Improving Service Quality," by Andreas C. Soteriou and Richard B. Chase, presents a model that links service operational variables to service quality metrics, and then uses robust optimization to develop trade-offs to aid service managers in making resource-allocation decisions. The method is applied to managing a large health-care facility.

1523-4614/00/$05.00
1526-5498 electronic ISSN

Contribution to Theory: Soteriou and Chase demonstrate that robust optimization can be used to make cost-quality trade-offs in service systems characterized by noisy or erroneous data. This paper also demonstrates how the "3 T's" operational framework can be used to identify relevant operational variables, and how this framework can be related to the widely used service-quality framework of Parasuraman et al.

Contribution to Practice: This paper provides a step-by-step approach to answer questions such as, "Is it more cost effective to invest in staff training in service quality or in tangible features of a process such as cleaning and maintenance?" One general insight provided is that effectiveness measures, such as customer quality perceptions, *can* be incorporated into a service manager's decision making.

"Contract Assembly: Dealing with Combined Supply Lead Time and Demand Quantity Uncertainty," by Jing-Sheng Song, Candace Yano, and Panupol Lerssrisuriya, addresses a common problem faced by a contract assembler that is also responsible for procuring component parts with random lead times. The analysis focuses on a single customer order whose desired delivery quantity is also random. The goal is to determine planned production quality and lead time(s) that minimize total expected costs, which include the cost of holding components prior to assembly, a penalty for tardiness with respect to the assembly due date, and overage and underage costs associated with the delivered quantity.

Contribution to Theory: The analysis provides insights into the form of the optimal policy, develops an optimization procedure, and heuristics. The principal result—that random lead times (usually) lead to smaller order quantities—is interesting because it is unlike results for other models in the literature with random demands and leadtimes. Computational results indicate that ignoring lead-time uncertainty can be costly, but that relatively simple heuristics that consider it perform quite well.

Contribution to Practice: Many contract manufacturers, particularly in high-technology industries, are being asked to procure the components for the finished goods that they assemble. The authors' analysis yields the insight that it may be more important to consider lead-time uncertainty for components than customer-demand uncertainty. Hence, simple heuristics that incorporate this uncertainty perform much better than decision-rules that do not.

The emergence of new business models, such as the rise of "big box" superstores, have placed new demands on traditional supply chains. One result is that many manufacturers have turned to third-party logistics providers. These partnerships have introduced a new set of requirements to negotiate compensation for distribution services. "Optimizing Delivery Fees for a Network of Distributors," by Anantaram Balakrishnan, Harihara Prasad Natarajan, and Michael S. Pangburn, which is based on a collaborative project with a leading building-products manufacturer, describes the development and implementation of a novel linear-programming model to determine delivery fees.

Contribution to Theory: The formulation of the compensation-design problem is an atypical use of linear programming. This formulation may present opportunities for solving related problems.

Contribution to Practice: This paper devotes significant attention to describing the practical issues relating to the business scenario, and to the insights gained during the problem structuring and modeling phases of the research. Insights are provided into the impact of demand uncertainty, interdependencies among distributors, and the alternative forms of constraints on compensation structures.

Leroy B. Schwarz
Editor-in-Chief