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In this issue ...

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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 lead article in this issue, "Sustaining Technology Leadership Can Require Both Cost Competence and Innovative Competence," challenges the commonly-held view that in pursuing a business strategy based on innovation, cost can be ignored. On the contrary, in their model of technology competition, Glen M. Schmidt and Evan L. Porteus demonstrate that in situations where there is an opportunity for a new, competing product, then "cost competence" (i.e., the firm's ability to produce that product at a cost lower than that of a potential competitor) can be essential.

Contribution to Theory: This paper introduces and analyzes a model for technology competition based on both cost competence and "innovative competence" (i.e., the incumbent monopolist's relative advantage in being able to achieve technological innovation from a given investment).

Contribution to Practice: Most important, this paper draws attention to the critical role that cost competence—largely the domain of operations management—can play in the success of a technology-based business strategy. In particular, this paper demonstrates that although the immediate returns from cost competence may be small, the long-term returns may be quite high because they deter competitors from entering the market.

Capacity considerations are among the key drivers in operations-management decision-making. Capacity planning, in turn, typically depends on risk-return considerations. these considerations are well developed in finance, but operations-management models do not generally incorporate them. "Option Methods for Incorporating Risk into Capacity-Planning Models," by John R. Birge, demonstrates how risk-return considerations can be incorporated into capacity-planning models.

Contribution to Theory: After a short review of financial option pricing, the theory of efficient markets and the capital-asset pricing model are then incorporated, first, into a simple, single-product capacity-valuation problem, then, into a more complex model.

Contribution to Practice: This paper demonstrates how the well-developed theory of option pricing can be applied to capacity-planning problems.

Does cross-training workers allow a firm to achieve economies of scale when there is variability in work content, or does it create a workforce that performs a variety of different tasks in a mediocre fashion? This is the question raised by Edieal Pinker and Robert Shumsky in "The Efficiency-Quality Tradeoff of Cross-Trained Workers." They begin by adding models of tenure-based and experience-based quality to a simple model of a stochastic service system. The output of the enhanced model is the revenue derived from customers served, where revenue depends on the quality of service, and quality of service depends on the cumulative experience of the server.

Contribution to Theory: As might be expected, when analyzed, the simple model displays the well-known phenomenon, that flexible, cross-trained workers provide more throughput with fewer workers than specialized servers. However, in the enhanced model these economies of scale are tempered by a loss in quality, and, hence, reduced revenue. Through a series of numerical experiments, the authors find that low utilization in an all-specialist system can also reduce quality, and therefore, the optimal staff mix combines both flexible and specialized workers.

Contribution to Practice: The model developed here should provide more balanced insight to managers regarding the level of specialization versus cross-training than the traditional economy-of-scale model, particularly in those situations where revenues are based on quality of service and quality of service is based on server experience. The model is applied to data from the call center of a consumer bank to determine the optimal staffing configuration.

"Management of Worksharing Systems," by John McClain, Kenneth Schultz, and L. Joseph Thomas uses

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simulation to examine rules for assigning workers in a serial manufacturing system in a variety of situations: unequal work content across machines, uncertain processing times, unequal workers, handoffs with and without preemption, and a range of machine-to-worker ratios.

Contribution to Theory: The results of the simulation experiments indicate that worker sequence is quite important: slowest-to-fastest is recommended in some situations, but performs poorly in others. Preemption versus non-preemption can have a significant effect on productivity in systems without inventory buffers; but with or without preemption, the appropriate combination of worker sequence, zone size, and production-control rules is demonstrated to nearly eliminate idle time.

Contribution to Practice: The popularity of the Toyota Sewing System (TSS) and the "bucket brigade" has focused a great deal of management attention on the use of worksharing systems. In particular, earlier work has established that using overlapping zones can essentially eliminate idle time in some cases. This work demonstrates that there are many realistic situations where great care must be taken in the design in order to achieve the maximum benefits that worksharing can provide.

"Optimizing Strategic Safety Stock Placement in Supply Chains," by Stephen C. Graves and Sean C. Willems, develops an optimization model to determine the placement of safety stock in a supply chain that is subject to demand or forecast uncertainty.

Contribution to Theory: Given a spanning-tree structure, and assuming that each stage of the chain operates using a periodic-review, base-stock policy, that demand is bounded, and that there is a "guaranteed service time" between every stage and its customers, Graves and Willems are able to formulate the safety-stock positioning problem as a *deterministic* problem, for which they develop an optimization algorithm.

Contribution to Practice: This paper provides a tactical tool to help cross-functional teams in their efforts to model supply chains in order to improve their performance. The authors describe the successful use of this tool by product-flow teams at Eastman Kodak. Commercial-quality software that incorporates the authors' model can be downloaded from the authors' website.

Using two manufacturing scenarios in order to motivate their model, "Properties of Optimal-Weighted Flowtime Policies with a Makespan Constraint and Set-up Times," by Mark Van Oyen and Juta Pichitlamken, attempts to characterize the nature of a non-preemptive scheduling policy that minimizes the sum of the inventory-holding costs of waiting jobs and draw insights from this characterization.

Contribution to Theory: The optimal scheduling policy is partially characterized by means of a Gittins reward-rate index and a similar switching index derived from multi-armed bandit theory.

Contribution to Practice: the primary insights provided surround the question of when it is reasonable to apply a very simple policy with only a few set-ups per product family.

"A Risk-Free Perishable Item Returns Policy," by Scott Webster and Z. Kevin Weng, takes the viewpoint of a manufacturer selling a short life-cycle product to a single, risk-neutral retailer, and describes returns policies that, when compared to no returns, increase the retailer's expected profits and provide an expected profit to the manufacturer that is at least as large. The authors call such a returns policy "risk free."

Contribution to Theory: The authors derive necessary and sufficient conditions for a risk-free returns policy and compare the manufacturer's expected profits under two alternative risk-free return policies: "quantity-rebate" and "percent-rebate."

Contribution to Practice: Returns policies are shown to increase the "upside potential" of manufacturer profit by encouraging retailers to order more. However, returns policies may also introduce "downside exposure" through high rebate costs when demand is low.

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