PRODUCTION AND OPERATIONS MANAGEMENT

POMS

Vol. 20, No. 1, January–February 2011, pp. vii–ix
ISSN 1059-1478 | EISSN 1937-5956 | 11 | 2001 | 0vii

DOI 10.1111/j.1937-5956.2010.01176.x

Management Insights

The Controversial Role of GPOS in Healthcare-Product Supply Chains
Qiaohai (Joice) Hu, Leroy B. Schwarz

There have been heated debates on the controversial role of healthcare Group Purchasing Organizations (GPOs) which negotiate contracts with vendor on the behalf of healthcare providers. These GPOs cover their costs by charging manufacturers "Contract Admi nistrative Fees," instead of being reimbursed by the providers. This causes conflicts of interests. Therefore, purchasing through GPOs might not lower providers' purchasing costs. Hu and Schwarz demonstrate that the presence of a GPO lowers providers' purchasing cost by intensifying competitions among manufacturers. However, the presence of GPOS lowers manufacturers' incentive to innovate. We also conclude that eliminating the "safe harbor" provisions that permit healthcare GOPs to charge contract administration fees to manufacturers would not affect any party's profit or cost.

Matching Product Architecture and Supply Chain Configuration
Sezer Ülkü, Glen M. Schmidt

OEMs (original equipment manufacturers) such as Boeing have increasingly relied on suppliers for the development of subsystems, resulting in a "decentralized supply chain." A modular-product architecture is commonly prescribed to best accommodate this decentralization, as it helps avoid difficulties in technical coordination between the OEM and its suppliers. Conversely, an integral product is generally thought to be best developed within a vertically-integrated organizational structure. However, these prescriptions are not always followed – and for good reason. An integral product is a good fit even for a decentralized supply chain in situations where the supplier has strong development capabilities, the OEM and supplier have a collaborative relationship, and the product volume is high. Under these conditions, a high-performing integral product can be developed without excessive collaboration costs and without excessive "friction" between the OEM and supplier. However when these conditions are not present, it may indeed be best for the firm to use modularity to insulate or "buffer" the system from its "deficiencies," effectively decoupling the product subsystems in much the same way as inventory decouples the processes in a production system.

Competing for Shelf Space
Victor Martinez-de-Albeniz, Guillaume Roels

Despite the rampant product proliferation over the past decades, retail shelf space has roughly remained constant, leading to an intensification of the competition for shelf space. In the competitive dynamics that arise at a retail point, the incentive misalignment among the supply chain intermediaries leads to suboptimal shelf space allocations. The inefficiency associated with suboptimal shelf space applications is however small (it is in fact no larger than 6%), especially when compared to the inefficiencies that arise from suboptimal pricing decisions, which can be as high as 27%. The inefficiency of suboptimal shelf space allocation can moreover be eliminated if the retailer adopts a pay-to-stay fee contract.

Category Captainship versus Retailer Category Management under Limited Retail Shelf Space
Mümin Kurtuluş, L. Beril Toktay

A product category is defined as a group of products that consumers perceive to be interrelated and/or substitutable. Category management is a process for managing entire product categories as business units and involves decisions such as product assortment, pricing, and shelf-space allocation to each product on the basis of category goals. Traditionally, category management decisions were taken by the retailer. Recently, however, retailers have started to outsource category management to their leading manufacturers, a practice often referred to as "category captainship". While many retailers have successfully implemented category captainship practices, there is an emerging debate on whether or not category captainship poses antitrust challenges such as competitive exclusion, where the category captain takes advantage of its position and harms the other manufacturers in the category. Mümin Kurtuluş and L. Beril Toktay show that shelf space scarcity has significant implications regarding the implementation of category management. They argue that category captainship practices should be scrutinized for competitive exclusion when imple-

mented in categories where either the category includes many similar products and/or the retailer is not powerful enough compared to the category captain.

On the Benefits of Risk Pooling in Inventory Management
Oded Berman, Dmitry Krass, M. Mahdi Tajbakhsh

Inventory pooling, i.e., consolidation of inventory across locations into a single location, is generally believed to be beneficial, as the centralized location faces less demand variability than the individual locations. Since the reduction in variability is greatest when the demand faced by the individual locations has high variability, one would expect the benefits of inventory pooling to increase with the variability of the demand. However, several recent publications have cast doubt on the benefits of inventory pooling, by showing that the savings due to pooling may approach zero under some conditions. This paradox is investigated in the current paper. The authors show that the absolute benefit of inventory pooling (the reduction in the cost of operating the system due to inventory pooling) increases with variability, and the relative benefit (relative to the non-pooled system) stays fairly constant, as long as the demand variability stays in the low range. However, under high-variability conditions, both measures decrease to zero as the demand variability is increased. These effects are due to the different operating regimes exhibited by the system under different levels of variability: as the variability is increased, the system switches from the normal operation to the effective shutdown (the system avoids taking the risk of too much inventories) and then to the complete shutdown (the system holds no inventory and accepts the full costs of unmet demand) regimes; the decrease in the benefits of inventory pooling is associated with the two latter stages. Pooling allows the system to remain in the normal operation regime under higher levels of variability compared to the non-pooled system. Thus, inventory pooling is, indeed, beneficial under all variability conditions.

Inventory Control when the Lead-time Changes
Sven Axsäter

Sven Axsäter considers a standard single-level inventory system with random demand where there is a change in the lead-time at a certain time. A lead-time change may, for example, occur if we change to another supplier with a different delivery lead-time. The length of the lead-time will clearly affect the optimal inventory policy in steady state. So in the long run we should change from the optimal policy for the original lead-time to the optimal policy for the new lead-time. However, it is normally far from optimal to make the policy change in a single step. The policy should instead be changed gradually. This paper shows how this can be done. The main focus is on a lead-time decrease which is common when applying a so-called Just-In-Time philosophy, but he also considers a change to a longer lead-time, which leads to a much simpler optimization problem.

Price, Rebate, and Returns Supply Contracts for Coordinating Supply Chains with Price Dependent Demands
Chun-hung Chiu, Tsan-Ming Choi, Christopher S. Tang

Channel rebates and returns policies are common mechanisms for manufacturers to entice retailers to increase their order quantities and sales ultimately. However, when the underlying demand depends on the retail price, it is well-known that supply-chain coordination cannot be achieved if only one of these mechanisms is deployed. Motivated by industrial cases, Chun-hung Chiu, Tsan-Ming Choi, and Christopher S. Tang analytically show that a hybrid policy that combines the use of wholesale price, channel rebate, and returns can coordinate supply chains with price-dependent demands. This hybrid policy is also found to be fairly flexible because there exist multiple sets of contract parameters which can coordinate the supply chain. The conditions under which there exists a unique supply-chain coordinating hybrid policy are also revealed. The authors further develop a mechanism for properly setting contract parameters so as to achieve Pareto (''win-win'') improvement in the coordinated supply chain.

Supply Chain Sourcing Under Asymmetric Information
Özalp Özer, Gal Raz

Manufacturers often face the dilemma of sourcing from an established supplier and/or a relatively less-known supplier. In 2004, before introducing the new flash memory based iPods, Apple Computer had the choice of sourcing the flash memory from suppliers such as SigmaTel and Intel. This was a critical decision for Apple. The flash memory chip was an important part of the iPod. The dynamics of the possible sourcing contract would be different for each of the two suppliers. A small supplier, such as SigmaTel, perceives the opportunity to work with Apple, as a way to establish reputation. The manufacturer's business constitutes a large proportion of the small supplier's business. However, a big supplier, such as Intel, can provide expertise and production scale which enables

production at a cheaper cost. Such a supplier often works with many other customers and the manufacturer's business constitutes a relatively small part of his business. To some degree, these dynamics enable Intel to dictate contract terms while considering Apple's sourcing option with SigmaTel. This paper investigates optimal contracting strategies. It also considers various information scenarios regarding production costs and quantifies the cost (value) of the alternative sourcing option for the big supplier (the manufacturer).

Effect of Learning and Forgetting on Batch Sizes
S. Teyarachakul, S. Chand, J. Ward

Frequent repetition of tasks in a manufacturing environment leads to moving down on the learning curve and therefore improved productivity. A break or interruption in performing leads to forgetting and therefore loss of productivity. Managers need to pay attention to the effect of learning and forgetting on productivity in planning and scheduling the production. Teyarachakul, Chand, and Ward show that in a batch manufacturing environment where a menu of products is being produced on a shared resource, firms may be better off producing each product in the menu in smaller batches. The effect of producing in small batches at short intervals is that forgetting does not take effect or is minimal. As a result, learning that occurs in a batch gets transmitted to the next batch without any losses. The insights in the paper provide one more justification for small-lot production in just-in-time manufacturing environments.

Advance Selling by a Newsvendor Retailer
Ashutosh Prasad, Kathryn E. Stecke, Xuying Zhao

Many retailers sell in advance before the selling season starts. For example, Amazon sells new to-be-released products in advance through pre-orders before they are released. Prasad, Stecke, and Zhao find that an advance selling strategy is not always optimal, but is contingent on parameters of the market (e.g., market potential and uncertainty) and the consumers (e.g., valuation, risk aversion, and heterogeneity). For example, they find that retailers should sell in advance if the consumers' expected valuation exceeds consumers' expected surplus when not buying early by a certain threshold. This threshold increases with the degree of risk aversion but decreases with stock out risk. If the degree of risk aversion varies across consumers, then a retailer should sell in advance if the probability for a consumer to spot buy is less than a critical fractile.

A Note on the Relationship Among Capacity, Pricing and Inventory in a Make-to-Stock System
Gad Allon, Assaf Zeevi

Recent years have witnessed an increased interest in the use of pricing in operations management practices, with a particular focus on the integration of inventory control and dynamic pricing strategies. Concomitantly, studies focusing on the interface between capacity investment and replenishment strategies have led to further understanding of capacitated inventory systems and supply chains. A very useful qualitative insight in this context has been the understanding that capacity and inventory are in essence strategic substitutes. Allon and Zeevi study a stylized problem and address the simultaneous determination of pricing, production and capacity investment decisions by a monopolistic firm in a multi-period setting under demand uncertainty. They analyze the optimal decision with particular emphasis on the relationship between price and capacity. They consider models that allow for either bi-directional price changes or models with markdowns only, and in the latter case they prove that capacity and price are strategic substitutes.

A Note on Air-Cargo Capacity Contracts
Kannapha Amaruchkul, William L. Cooper, Diwakar Gupta

Airlines use two mechanisms to sell cargo space – guaranteed-allotment contracts with freight forwarders who deliver consolidated loads before each flight, and ad-hoc sales to direct-ship customers on individual flights. Capacity management in this context requires airlines to determine how much capacity to allot to forwarders and how much to reserve for potential sale to direct-ship customers. This problem is difficult because forwarders typically have private information, such as knowledge of their own customers' demands. Amaruchkul, Cooper, and Gupta study contracts in which a forwarder receives a per-flight allotment of capacity and, in exchange, makes a lump-sum payment to the airline. Also, each contract allows the forwarder to return any unused portion of the allotment for a refund determined by a per-unit refund rate specified in the contract. The authors identify conditions under which an airline can, by offering a menu of contracts with appropriate choices of allotments, lump-sum payments, and refund rates, induce the forwarder to choose a contract that eliminates the effects of the forwarder's private information and that maximizes the combined profit of the airline and forwarder. The authors also provide an expression for the maximum expected informational rent that the airline might pay in this context for a menu of arbitrary allotments.