Management Insights

Co-opetition and Investment for Supply-Chain Resilience
Nitin Bakshi & Paul Kleindorfer

Because of outsourcing and offshoring, supply chains have become longer and more complex in the past decade, with huge increases in intermediate and final goods destined for manufacturers and retailers in North America and Europe, originating in emerging markets in Asia. While overall costs of procurement have decreased as a result, CEOs and supply managers have also noted a strong increase in inter-dependent supply-chain risks and a greater need for coordination between trading partners in order to avoid disruptions in supply. Such coordination is, however, itself a complicated affair because of lack of information about the suppliers' local environment. The latter dimension also presents suppliers with the opportunity to strategically misrepresent their level of vulnerability and the cost of mitigating supply-chain risks. With this environment as the basic context, the authors analyze a two-tier supply chain in which the trading partners can invest jointly in supply-chain resilience, e.g., through end-to-end RFID implementation. The authors find that a non-cooperative approach leads to under-investment, as compared with a coordinated supply chain. This inefficiency can be mitigated through bargaining between the trading partners, and appropriately compensating upstream (typically smaller) trading partners to encourage them to mitigate supply-chain disruption risks.

E-Business: A Review of Research Published in *Production and Operations Management* (1992–2008)
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The managers, who plan, design, and implement Internet-based business systems, need to focus on a broad spectrum of issues that include: customers' attitudes, expectations, and satisfaction; internal organizational environment, relationships among partners in the supply chain, collaborative strategies, and coordination mechanisms; and the technology selection and deployment. The authors review, classify, and synthesize these issues into the following four categories: (1) e-auctions, (2) radio frequency identification, (3) e-business system design, and (4) competition, conflict, collaboration, and coordination (C^4 in e-business). The issues that are important in the design of e-auction systems include the following: communication among buyers and sellers, non-price factors, collusion, combinatorial auctions, reserve prices, bid increments, pre-qualifying bidders, post-auction audits, technology support, and assumptions about the cost and revenue functions. Radio frequency identification (RFID) is an enabling technology for real-time data collection and has a great potential to support and promote e-business activities. RFID tracks the movement and flow of items in a supply chain and provides visibility to managers about the location and condition of the tracked items. The real-time information is valuable because it helps to increase asset utilization and to minimize inventory- and logistics-related costs. RFID also minimizes delays in information transmission, leading to improved information sharing among the partners in a supply chain.

Designing a user-friendly web interface is crucial for improving customer satisfaction and ensuring the ultimate success of e-business activities. The design, development, implementation, and evaluation of an e-business system involve technological considerations, customers' attitudes and expectations, and the internal organizational environment. The important factors that influence customer satisfaction and loyalty include: the system flexibility, the quality of service, the product attributes, and the perceived ease of using the e-business systems. The design of e-business system should also take into account the customer characteristics in case of heterogeneous customers. E-process adoption is easier if the internal organizational environment supports the e-process and the e-process leads to improved organizational performance. The mixed-channel supply chains in which a manufacturer, through a direct (Internet) channel, competes with his/her own traditional brick-and-mortar retailer for the same consumer market create a situation of conflict. The research studies suggest several strategies to minimize conflict, which include: the revisions in the wholesale and retail prices, the authority to fix these prices, diversion of the customers to the direct channel by the reseller for a commission, and fulfilling the demand only through the reseller. In addition, the retailer may be allowed to add other features and value to differentiate his/her

product and offering from the one sold through a direct channel by the manufacturer. A firm's profitability can be increased by an appropriate choice of the rationing policy when dealing with different group of customers based on the customers' sensitivity to prices and delivery lead times. In case of multiple channels available to an e-tailer, the expected profit can also be increased by optimally controlling the timing of the periods during which various available channels are opened and closed.

How to Win "Spend" and Influence Partners: Lessons in Behavioral Operations from the Outsourcing Game
Jason Amaral, Andy A. Tsay

Real supply chains are messy. Hidden actions, hidden information, and misaligned incentives are ubiquitous, and outsourcing only exacerbates their impact. Supply chain coordination increasingly requires diplomacy where central authority was once adequate, and success often depends on negotiation prowess. Typical management tactics are better explained by bounded rationality and behavioral biases than by economic optimization. The authors designed "The Outsourcing Game" to convey to current and future managers (nearly 1000 worldwide through 2008) crucial messages about power, trust, and reputation in an outsourced world. This role-play simulation depicts the adventures of Acme, the brand owner of a product manufactured by an outsourced supply chain. Through a series of negotiations, Acme attempts to influence its partners (two suppliers and two service providers) by distributing its procurement "spend." These partners, in turn, sway each other via side payments. This paper analyzes a database of game results to reveal behavioral factors that can undermine conspicuous win-win process improvements. For instance, preferences can be sensitive to the sequence in which the alternatives are encountered; decision-makers might value not only their own rewards, but also fairness in the allocation of total gains; and effectiveness of negotiation tactics will vary with community norms of acceptable behavior.

The Role of Slotting Fees in the Coordination of Assortment Decisions
Göker Aydın and Warren H. Hausman

Large numbers of new products introduced annually by manufacturers may strain the relationship between retailers and manufacturers regarding assortments carried by retailers. For example, many retailers in the grocery industry will agree to broaden their assortments with new products only if the manufacturer agrees to pay slotting fees. There are two distinct opinions on slotting fees: proponents argue that slotting fees enhance channel efficiency, while opponents maintain that slotting fees are merely a source of extra revenue for retailers. One of the arguments in favor of slotting fees is that these fees induce retailers to offer products that would otherwise not make it to the market. The authors' analytical modeling results give qualified support to this claim. They find that the supply-chain-optimal level of variety is higher than that which the retailer would be willing to offer. When the wholesale price is not too high, a contract that resembles slotting fees induces the retailer to offer the supply-chain-optimal assortment. Such broadening of the retailer's assortment improves the manufacturer's profits as well. Therefore, the manufacturer may be more than willing to pay slotting fees. These observations suggest that slotting fees may indeed improve supply chain efficiency.

Optimal Reserve Prices in Name-Your-Own-Price Auctions with Bidding and Channel Options
Gangshu (George) Cai, Xiuli Chao, and Jianbin Li

Since its launch by Priceline in 1998, name-your-own-price (NYOP) auctions have been a special and intriguing revenue management mechanism for hotels, airlines, rental cars, and so on. Over the past 10 years, Priceline has changed its bidding policy, including the number of biddings during a period of time, several times. This observation motivated the authors to evaluate the optimal reserve prices of the NYOP auctions in a variety of scenarios, including single-bid and double-bid bidding policies in single-channel and dual-channel environments. Their analyses demonstrate that the optimal reserve price in the double-bid scenario is no less than that in the single-bid case, and the addition of a retailer-own list-price channel could push up the reserve prices in both single-bid and double-bid scenarios. Furthermore, a double-bid scenario can outperform a single-bid scenario in both single-channel and dual-channel situations.

Integrated Order Scheduling and Packing
Zhi-Long Chen, Guruprasad Pundoor

Production and distribution are two key operational decisions in a supply chain. They are interdependent and should be planned and scheduled jointly in order to achieve a desired customer service level at minimum total cost. Consider an integrated production-distribution scheduling model in a make-to-order supply chain consisting of one supplier and one customer. The supplier receives a set of orders from the customer at the beginning of a planning horizon. The supplier needs to process all the orders at a single production line, pack the completed orders to form delivery batches, and deliver the batches to the customer. Each delivery batch incurs a fixed distribution cost. The problem is to find jointly a schedule for

order processing and a way of packing completed orders to form delivery batches such that the total distribution cost is minimized subject to the constraint that a given customer service level is guaranteed. The authors consider two customer service constraints—meeting the given deadlines of the orders or requiring the average delivery lead time of the orders to be within a given threshold. The authors propose fast heuristic solution algorithms for several problems with each of the service constraints. The algorithms are easy to implement in practice and hence can be used by managers to tackle similar problems they face in their operations.

The Newsvendor Model with Consumer Search Costs
Nicholas C. Petruzzi, Kwan E. Wee, Maqbool Dada

In the classic newsvendor model, the decision maker has no control over the demand for its product. Hence, the newsvendor essentially acts reactively by choosing an order quantity that minimizes expected operating costs. However, the newsvendor can behave more strategically by influencing demand when consumers are known to be heterogeneous, where, in this context, heterogeneity can arise either in the valuation of the newsvendor's product or in the valuation of the search cost for that product. When there is heterogeneity only in the search cost valuations, the authors show that the newsvendor manages demand by promoting the product, for example, by offering a discount. In such instances, a mild condition on the elasticity of expected demand is sufficient to assure that the newsvendor's first-order conditions yield a unique solution. In contrast, when there is heterogeneity only in the product valuations, we show that the newsvendor manages demand by setting price. In such instances, not only is a mild condition on the elasticity of expected demand required for uniqueness, but so, too, is a condition on the elasticity of expected sales. However, the condition on the elasticity of expected sales is equally as mild a restriction. When there is heterogeneity in both product valuations and search costs, a somewhat stronger condition on the elasticity of expected demand may be required to guarantee uniqueness.

Inventory Management for Customers with Alternative Lead Times
Haifeng Wang and Houmin Yan

Companies that deal with patient and impatient customers can satisfy their discriminating customers'

needs in choosing products and services from multiple alternatives. The authors argue that the lead-time is a noticeable control variable for distribution. Provided that the customers can be segmented by their lead time requirements, the model is capable in assisting design, evaluation, and capitalization aspects for market segmentation. By deploying the delivery flexibility from patient customers, the supplier profit can be improved by balancing the tradeoff among saving inventory holding cost, anticipating potential impatient orders, and reducing penalty cost of failing to satisfy promised orders. The optimal inventory-commitment policy is given to provide the sales personnel not only with a real-time approach for market segmentation execution, but also with an optimal strategy for market segmentation capitalization. The study of the dynamics of the demand induction and cannibalization presents a way of evaluating the impact of a market segmentation strategy. The authors conclude that the supplier benefits from the market segmentation strategy by the utilization of the delivery flexibility from the impatient customers and the demand induction, while its profit can be hurt by the demand cannibalization.

Social Optimal Location of Facilities with Fixed Servers, Stochastic Demand, and Congestion
Ignacio Castillo, Armann Ingolfsson, Thaddeus Sim

Do you always go to the closest bank branch when you need cash? Perhaps not, if you know that a branch that is further away typically has a shorter wait. Models for optimal facility location often ignore such considerations and assume that people will choose the geographically closest service facility. System planners and managers, thus, need models that use a new measure of convenience to aid in their decision-making process. Such a measure should acknowledge that people consider both travel times and waiting times important. With this in mind, the authors develop models that optimally choose facility locations and facility capacities, with the aim of reducing the overall time spent by all patrons traveling and waiting for service. The proposed optimal facility location models are robust to the parameter values, thus providing practically useful solutions. They use their model to benchmark the current locations of automatic teller machines of a national bank in a medium-sized North American city, and find that the current locations fall far short of minimizing customer travel and waiting times.