

## Research and Management Insights

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### **POMS Initiatives for Promoting Practice-Driven Research and Research-Influenced Practice**

Kalyan Singhal, ManMohan S. Sodhi, and Christopher S. Tang

Kalyan Singhal, ManMohan Sodhi, and Christopher Tang announce three new initiatives on behalf of Production and Operations Management Society (POMS) and its journal, *Production and Operations Management (POM)*: (1) *POM Review*, an online publication; (2) POMS Practice Leaders Forum; and (3) POMS Applied Research Challenge. These initiatives are intended to achieve the following goals: (1) To rewrite research findings, particularly those published in *POM*, to make clear their managerial implications and to disseminate them to practitioners, MBA students, and participants in executive development programs; (2) to solicit descriptions of current and emerging problems from practitioners and share them with academics; and (3) to recognize academic research based on direct work with practitioners.

### **The Effect of Product Development Restructuring on Shareholder Value**

Brian W. Jacobs, Vinod R. Singhal

Firms often undertake product development restructuring (PDR), a form of organizational restructuring that realigns, refocuses, or reorganizes a firm's product development activities and organization. Based on a sample of 165 PDRs, Brian Jacobs and Vinod Singhal provide empirical evidence on three issues. First, the stock market reacts positively to PDR, and the reaction is greater than that to other forms of organizational restructuring. This provides further evidence of the important relationship between product development structure and firm performance. Second, the most common purposes associated with PDRs are identified as improving cost efficiency, changing portfolios, building capabilities, enhancing coordination, and shifting development stage focus. These purposes are accomplished by actions including layoffs, scope reductions, consolidations, or changes in number of units or decision struc-

tures. Regardless of PDR purpose or action, the market reaction is mostly positive. For managers contemplating PDR, this suggests a variety of restructuring approaches that can improve shareholder value. Third, in contrast to previous studies on organizational restructurings, we find that PDRs are generally not preceded by poor financial performance or increased levels of external control threats, but that they are preceded by a greater level of CEO turnover. This suggests that PDR may be more motivated by the need to address future performance issues rather than current or past problems.

### **Economic and Environmental Assessment of Remanufacturing Strategies for Product+Service Firms**

Anton Ovchinnikov, Vered Blass, Gal Raz

Ovchinnikov, Blass and Raz present a framework by which product and service firms can assess the economic and environmental impact of remanufacturing and apply this framework to a stylized product line of a wireless communications firm. They show the following: (1) For such firms, remanufacturing is nearly always profitable because flexibility in pricing and new product positioning minimizes demand cannibalization. (2) In some cases, demand cannibalization of new products can be negative: that is, the firm might find it profitable to decrease the prices of new products and sell more of them so that a greater number can later be recovered and resold as refurbished products. (3) Although negative cannibalization and growth in the production and sales of new products can increase a firm's total environmental impact, the relative impact is decreased when viewed either per unit sold or per dollar of profit.

### **Analysis and management of periodic review, order-up-to level inventory systems with order crossover**

Diane P. Bischak, David J. Robb, Edward A. Silver, Joseph D. Blackburn

Order crossover occurs in a supply chain when, due to lead time variability, orders arrive at their

destination out of sequence. Two trends suggest that supply chain managers will experience crossover with increasing frequency. Supply chains for global sourcing are lengthening and becoming more complex, which increases lead time variability and the likelihood of order crossover. Also, the adoption of JIT supply systems with smaller batch sizes and more frequent orders increases the potential for crossover. Most periodic-review models used to manage inventory for supply chains ignore, or assume away, the possibility of order crossover. Although crossovers may pose technical difficulties for modeling, they are surprisingly beneficial in practice because they reduce the realized lead time variability. Diane Bischak, David Robb, Edward Silver, and Joseph Blackburn employ a novel approximation of the realized lead time variability, resulting from crossovers, to develop an effective lead time distribution that more accurately reflects the reduced level of demand uncertainty present in the system. They show that, using this effective lead time distribution, managers can obtain more accurate estimates of actual inventory costs in periodic-review inventory systems, and they can lower supply chain inventory costs by using periodic-review policies that exploit the reduced variability that accompany crossovers.

### **On the preference to avoid ex-post inventory errors**

Mirko Kremer, Stefan Minner,  
Luk N. Van Wassenhove

Modern supply chains engage in a set of techniques and strategies that provide value by mitigating the costs from mismatches between supply and demand, such as accurate and quick response, advanced demand information, delayed product differentiation, and order postponement. Mirko Kremer, Stefan Minner, and Luk Van Wassenhove empirically investigate decision makers' willingness-to-pay for the option to postpone the inventory order with their upstream supplier until after downstream demand has materialized. The results show that decision makers overpay for the option to eliminate the risk of supply not matching demand (by up to 50%, relative to the expected value of this option). Contrary to intuition, risk aversion does not explain this behavioral anomaly. Rather, the data suggests that decision makers overpay because they derive additional non-monetary value from avoiding inventory errors.

### **Appointment Scheduling with No-Shows and Overbooking**

Christos Zacharias, Michael Pinedo

Patients' no-show behavior is a major concern for health care systems where arrivals are driven by scheduled appointments. One way to mitigate the impact of no-shows is the practice of overbooking, which potentially results in clinics' overcrowding. An optimal appointment schedule balances the trade-offs between the benefits of efficient physician utilization, and the costs of patients' waiting time and physician's overtime. Zacharias and Pinedo study an overbooking model for scheduling arrivals at a medical facility under no-show behavior, with patients having different characteristics. By considering both static and sequential scheduling, they provide explicit guidelines for the use of overbooking to compensate for no-shows and a new sequencing rule is introduced. They demonstrate that the no-show rate and patients' heterogeneity have a significant impact on the optimal schedule and should be taken under consideration. The structure of the optimal schedule possesses the following characteristics: a) it is front-loaded; most of the overbooking occurs towards the beginning of the working day, b) it can be split into different segments in which patients are sequenced in increasing order of their weighted probability of showing up. They also find that an overbooking model with deterministic service times yields a near optimal solution to the problem where service times are random.

### **Information Acquisition and Voluntary Disclosure in an Export-Processing System**

Long Gao, Zhaolin Li, Biying Shou

Export-processing is offshored production where buyers control the raw material input and sales and producers are responsible for production. The producers can privately acquire the yield information and share it with the buyers if doing so is profitable. Under the decentralized supply chain, however, only the middle-yield producers share the information; the low- and high-yield producers withhold information to extract excess input from the buyers. Among three corrective mechanisms, vertical integration is the most effective one; mandatory disclosure is counterproductive because of its suppressive effect on information acquisition; production restriction can significantly improve the buyer's profit but it can also motivate the producers to over-invest. A tough production restriction is an effective discipline device when the market potential and the processing fees are

high, and the disclosure cost is low. Contrary to conventional wisdom, the buyers may benefit from upfront concessions on the processing fee because of the incentive effect on information acquisition and sharing. Moreover, both parties should embrace business initiatives for lowering the direct costs of information and procurement, such as supplier certification programs, because of additional information incentives effect. The optimal strategies should strike a balance between three imperatives: cost savings, information acquisition and sharing.

## **Beyond Information Sharing: An Empirical Analysis of Vendor Managed Inventory**

Yan Dong, Martin Dresner, Yuliang "Oliver" Yao

Vendor managed inventory (VMI), a widely adopted supply chain collaboration program, has two components, information sharing and decision transfer of inventory management. While it has been shown that information sharing improves supply chain efficiency, Yan Dong, Martin Dresner, and Oliver Yao examine whether the decision transfer component of VMI increases supply chain efficiency over and above what can be achieved with information sharing. Using inventory levels and stockouts at distributor premises (i.e., the downstream firms) and inventory variance (a proxy for the bullwhip effect) at the manufacturer's premises to measure supply chain efficiency, they find, after strictly controlling for the benefits from information sharing, that both the distributors and the manufacturer benefit from the decision transfer component of VMI. Inventory levels and stockouts are reduced for the distributors and there is lower inventory variance for the manufacturer. They further quantify that VMI, on average, reduces inventory levels by 7%, stockouts by 31%, and inventory variability by 9%. A cautionary note is that according to their results, distributor inventory reduction benefits may erode over time, and thus downstream firms must be vigilant in monitoring performance results from implementing VMI.

## **The Effect of Competition on the Efficient-Responsive Choice**

Tong Wang, Douglas J. Thomas, Nils Rudi

A firm that can produce and deliver their product to market quickly – a capability often termed operational responsiveness – faces lower costs associated with supply-demand mismatch than a firm that is less responsive. This supply-demand matching benefit typically comes at a cost premium due to investment

in more storage and distribution points, use of overtime production, use of expedited delivery, etc. When a firm faces no product competition in the marketplace, the choice of whether or not to build responsive capabilities comes down to trading off the supply-demand matching benefit with the additional cost of responsiveness. Wang, Thomas, and Rudi discuss how product competition, rather than additional cost, can discourage a firm from building responsive capabilities. While a firm that is not responsive cannot react to changes in market demand, they benefit from higher sales relative to their responsive counterpart since they can commit their product to the market early. When product competition is sufficiently intense, no competing firm is willing to bear the sales disadvantage associated with having responsive capabilities, even if such capabilities are free to install.

The authors also examine settings where, in addition to faster delivery, responsive capabilities can include (1) more frequent production and delivery, (2) more flexibility in production timing, and (3) the ability to postpone final production. In all these cases, greater operational capabilities can magnify the competitive (sales) disadvantage, further discouraging the adoption of responsiveness. The authors show that when product competition is intense and the cost of installing responsiveness is relatively low, both firms, as well as their customers, would be better off by adopting responsiveness, but neither is willing to do so. Two arrangements observed in practice to overcome this situation are (1) a strong customer of the two competing firms – e.g., a retailer buying from two competing manufacturers for example – can insist on responsiveness, and (2) two competing firms can jointly commit to having responsive capabilities through the use of the same third party logistics provider.

## **Prioritizing and Monitoring Concurrent Project Work: Effects on Switching Behavior**

Elliot Bendoly, Morgan Swink, Wendell P. Simpson III

Project switching (when a worker shifts his/her attention from one project to another before completing the first project) is a common occurrence that can damage productivity. Elliot Bendoly, Morgan Swink, and Wendell Simpson show that work monitoring can be a significant cause of switching behavior. Unscheduled managerial progress checks tend to stimulate worker switching, while scheduled progress checks do not. Interestingly, if unscheduled checks happen earlier in a worker's task horizon, its effects on switching are even stronger. In addition, stating priorities for projects appears to do little to dampen workers' propensities to switch. Project man-

agers should be careful not to induce unwanted switching through their monitoring behaviors.

## Flexible Capacity Investments and Product Mix: Optimal Decisions and Value of Postponement Options

Panos Kouvelis, Zhongjun Tian

Panos Kouvelis and Zhongjun Tian develop a model for flexible capacity valuation and investments in the presence of uncertainty in both demand and product mix with aggregate demand forecast continuously evolving over the decision horizon, and with the capacity commitments postponed to a later time than the flexible capacity investment. The model fully reflects the intertwined nature of flexible capacity valuation and execution (capacity commitment, production and pricing) decisions. The solution to the sequential decision model provides useful valuation and capacity investment formulas to guide conceptually the complex capacity allocation and production decisions over time. The paper provides managerial insights on factors affecting the value and magnitude of flexible capacity investments and commitment postponement strategies, characteristics of environments appropriate for such investments, and the value of executing such strategies in the presence of demand uncertainty.

## When to Carry Eccentric Products? Optimal Retail Assortment under Consumer Returns

Aydın Alptekinoglu, Alex Grasas

When choosing their assortments for a particular product category, say different colors and styles of a golf shirt, should retailers always opt for what they think will be popular? Or, is there ever a case for carrying eccentric products, such as golf shirts in “bold” colors or truly “one-of-a-kind” styles? Aydın Alptekinoglu and Alex Grasas argue that relatively strict return policies with restocking fees (those with less-than-full refunds) can make eccentric products economically viable. They find that (1) when the refund for returns is sufficiently low – lower than the product’s salvage value – it is optimal to carry a mix of the most popular and the most eccentric products; (2) otherwise, for relatively high refunds, it is optimal to carry nothing but most popular products. The basic rationale for including an eccentric product in the optimal assortment is to possibly benefit from the resale of returned items. This benefit is higher for low-refund return policies, and eccentric products have a higher likelihood of being returned. Hence, strict return policies with sufficiently low refunds allow retailers to

share with consumers the risk of carrying eccentric products. In light of this study, retailers would be well advised to consider their return policy in assortment planning, especially if the policy is strict.

## Shelf Loathing: Cross Docking at an Online Retailer

Kyle D. Cattani, Gilvan C. Souza, and Shengqi Ye

The traditional process for an online retailer is to stock a warehouse with products available for “off-the-shelf” shipment to online customers. Given that online customers expect to wait to receive the product, sometimes for a delay of many days, there are possibilities for managing inventory flows in non-traditional ways. For example, there might be an opportunity to fill customer orders earlier than the promised ship date through a cross-docking transaction. Rather than picking the item from warehouse shelves, in a cross-docking transaction the item moves directly from the receiving dock to the shipping dock, saving both a shelving and picking transaction. If there are no other costs, the online retailer should cross dock when possible (i.e., a resupply arrives and there is a customer order to ship that day). On the other hand, cross-docking before the promised ship date potentially risks changing the customer’s expectations for how soon a product will be shipped. Consistently shipping prior to the due date might lead the customer to stop paying extra for expedited delivery. In this case, it might be costly for the retailer to cross dock earlier than required. Cattani, Souza, and Ye develop algorithms for determining when an item should be cross docked.

## Optimal Policies for Perishable Products When Transportation to Export Market Is Disrupted

Xiaoqiang Cai and Xian Zhou

How should a firm producing fresh products manage its finished and unfinished products to minimize losses when the transportation service to the export market is severely disrupted? Cai and Zhou develop a model to optimize and enhance the timing decisions in these problems. Their results reveal the following: (1) Each finished product waiting for delivery to the export market should be allowed to wait for a specific amount of time before it is switched to the local market. (2) Any deliberate postponement of processing of an unfinished product is not helpful, if the recovery time of the transportation service is highly uncertain. (3) The optimal policy to process the unfinished products should follow the order of an index comprising probabilistic information on the products and the dis-

rupted transportation service. The common industrial practices to finish as many products as possible to catch the delivery to the export market, or to finish as valuable products as possible to maximize the sales revenue in the export market, are actually not best policies, although they seem to be intuitive. (4) When

the production is subject to random market demand, the optimal export quantity should be determined appropriately together with the waiting and production decisions. The optimal policies are capable of cutting the overall costs substantially as compared to ordinary policies commonly adopted by the industry.