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Management Insights

Sourcing Through Auctions and Audits
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In many supply chain scenarios, obtaining complete information about suppliers is costly. This leads to a natural economic trade-off between the costs of obtaining such information and the benefits that accrue to the owners of such information. It is beneficial to utilize a combination of "market" information (an auction), a posteriori cost data for just the winning supplier (an audit), and a practical mechanism that provides the supplier the appropriate incentive to take the optimal action (a profit-sharing scheme). These three components representing well-known economic concepts can be implemented easily in practice. In different informational scenarios, appropriate combinations of these building blocks can reduce the impact of the information asymmetry and consequently improve supply chain efficiency.

Why Do We Observe Stockless Operations on the Internet? Stockless Operations Under Competition
Daewon Sun, Jennifer K. Ryan, Hojung Shin

One of the main advantages of electronic retailing, compared with traditional bricks-and-mortar retailing, is the ability to operate the firm with little or no inventory. Although there are clear cost advantages that can be obtained from such stockless (i.e., zero-inventory) operations, such a strategy can also lead to increased customer dissatisfaction and decreased demand due to longer order fulfillment times. However, the stockless policy can be a legitimate option for a firm that intends to avoid head-to-head competition with the existing dominant player in the traditional market if the firm focuses on attracting customers who may be less sensitive to waiting time for product delivery and offers a reduced price relative to the competing in-stock firm. Thus, in practice, the stockless policy becomes stockless operations with stock-out compensation. The following conditions may help stockless policies become more profitable: a high demand rate, a medium degree of fixed disutility, a low ordering cost, a high rate of inventory holding cost, and a purchasing cost comparable with that of other retailers.

Asymmetric Competition in B2B Spot Markets
Hila Etzion, Edieal J. Pinker

Suppliers that plan to use online spot markets need to evaluate what type of competition they are likely to face in such markets, as the performance of the spot market depends on the objectives of the suppliers that participate in it. Whereas some suppliers use the spot market as their sole source of business, others use it to liquidate inventory left after satisfying contracts with established customers. In many cases, suppliers that have contracts benefit from the existence of the spot market more than suppliers without contracts, and that they should be more concerned with expanding the spot market in its early stages. Once the spot market reaches a critical size, suppliers with no contracts benefit more from expanding the spot market. If demands in spot market demand and contracted demand are negatively correlated, meaning that buyers are splitting their demand between them, then suppliers with established contracts benefit. In contrast, suppliers who use the spot market as their sole source of business benefit from positive correlation between demands in the two channels.

Application Development Using Fault Data
Qi Feng, Vijay S. Mookerjee, Suresh P. Sethi

Given the large corporate expenditures on information technology, improving software development productivity would lead to dramatic payoffs. System building and coordination are two reciprocally dependent activities involved in the software development process. We investigate the trade-off between system integrity and maintaining the flow of development work. A policy is proposed that suggests the manager to set a threshold fault count for the coordination to be triggered. Our findings suggest that the marginal productivity in terms of contribution per developer decreases in the team size. A large team should use a low-frequency, resource-intensive coordination scheme. Furthermore, a stable threshold policy should be deployed for a team with a large variation of skill levels. Carefully controlling the process based on the fault reports is especially important for a team with a high overhead, low development productivity, and fast fault generation.

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Benchmarking and Monitoring International Warehouse Operations in Europe
M. B. M. de Koster, Bert M. Balk

A simple, respondent-friendly method for warehouse benchmarking and monitoring was applied to warehouses containing European distribution centers (EDCs) in a longitudinal study, covering the period 2000–2004. A new feature of the method is that the output variables reflect flexibility, quality, and work content. The method focuses on internal benchmarking and uses variables that in principle can be influenced by warehouse managers. The main conclusions of the study are:

1. Although over time there appears to be some catching-up, Asian and American EDCs have a backlog in efficiency, particularly in comparison with European EDCs.
2. The efficiency gap between public (outsourced) EDCs and own-account EDCs has become smaller over time.
3. Since 2000, there was an overall decline in efficiency of 6%.
4. Since 2000, technology improved by 3%.
5. Technological improvement was not sufficient to compensate for the loss in efficiency. The resulting decline of productivity was 3%.

Flexible Backup Supply and the Management of Lead-Time Uncertainty
Panos Kouvelis, Jian Li

Ensuring timely delivery is increasingly a concern in contemporary global supply chains, with failure to do so resulting in high penalties of lost sales, obsolete inventories, and expediting costs. When the demand rate is constant and the supplier lead times are uncertain, companies have traditionally relied on kanban-type replenishment and safety lead time. The approach is a good way to plan and manage uncertain supply lead time if there are no more opportunities for updated lead-time information or if there is a lack of any emergency responses to such information. However, a better way is to collect accurate lead-time information and to use a flexible backup supplier as an emergency response on top of safety lead time planning. The emergency response decisions involve whether to order and how much to order from the flexible backup supplier, with the objective of minimizing the cost of meeting demand. An optimal emergency response policy affects the optimized safety lead time of the original order placement and the cost of meeting demand. The flexible backup supplier has a dual role: as one of the two suppliers in a redundant supply system assigned to meet the demand initially, and as an emergency response to later arriving lead time information. The higher the randomness of the order lead time with the supplier, the higher the beneficial impact on the cost of meeting demand and in shortening the safety lead time from the use of the flexible backup supply options.

Contracting Under Vendor Managed Inventory Systems Using Holding Cost Subsidies
Mahesh Nagarajan, S. Rajagopalan

Numerous firms have implemented vendor managed inventory (VMI) systems with varying degrees of success. For VMI systems to be successful, firms have to carefully consider the contracting terms that impact the ownership of the inventory and the responsibility of inventory replenishment decisions. VMI systems can outperform retailer-managed inventory systems wherein a retailer makes replenishment decisions under the right contracting terms. For instance, this is true when the VMI system uses holding cost subsidy-type contracts wherein the manufacturer subsidizes the retailer's holding costs. These subsidies are also similar conceptually to dealer holdbacks given by manufacturers to retailers in the auto industry, and consignment sales contracts or credit terms such as "30 days net" used extensively in numerous industries. Such contracts are shown to be effective for the periodic replenishment of staple items, unlike in most prior works, which focus on contracting and coordination in single-period scenarios that are applicable for short life-cycle products.

Route-Independent Analysis of Available Capacity in Flexible Manufacturing Systems
Tamás Koltai, Kathryn E. Stecke

In flexible manufacturing systems, each operation of each part generally can be manufactured on one of several alternative machines. The actual routing of parts in such systems influences the available capacity of the manufacturing resources. The routing of a part is known only shortly before beginning the manufacturing operations. Therefore, information about available capacity is usually not known until the detailed routing is determined. Often, however, operations managers can use a route-independent answer to production planning questions. For example, how much can be produced of a certain part type and when are important capacity questions in business negotiations. Managers would like to know the answers to such questions long before production has been assigned to particular machines. Weeks or months in advance of actual production, the detailed routing and scheduling is not yet of interest or cannot be known. A mathematical model can be used to determine the route-independent analysis of the capacity of flexible manufacturing systems, based on a concept of operation types. With this model, managers can analyze the availability of capacity, the effect of capacity expan-

sion, and the effects of machine breakdowns, without yet knowing the detailed part routing information.

Scheduling Support Times for Satellites with Overlapping Visibilities
Gökçen Arkalı, Milind Dawande,
Chelliah Sriskandarajah

Low Earth orbit (LEO) satellites are part of the critical infrastructure for natural resource management, crop yield estimation, flood control, communication, and space research. Efficiently supporting LEO satellites is an issue of critical importance for the agencies that own and operate them. While in orbit, LEO satellites perform a variety of tasks including providing earth imagery, collecting and transferring data, and providing real-time communication services. A ground station retrieves the information revealed by these tasks and manages the daily activities of an orbiting satellite. A ground station, however, can retrieve the results of a task only when the corresponding satellite is visible. For a given time horizon, the time windows of the set of satellites that are visible from a ground station typically overlap. A formal method can be used to schedule ground station support times to passing LEO satellites with overlapping time windows. Because the marginal utility of engaging with a satellite typically decreases with time, a ground station may only support a satellite for a subinterval of its visibility window, download the results of a few important tasks, and switch its support to another satellite that offers more utility. This time-utility tradeoff is at the heart of the method.