

## IEOR 153 Fall 2004 Practice Final Exam

I. Circle T for true or F for false. If the statement is false, add, delete, or change a few words to make it true

- (a) A pull strategy makes the most sense for low variability, high transportation cost products.
- (b) Dynamic pricing can help firms take advantage of available capacity, especially when demand is highly seasonal.
- (c) Redesigning a product to take advantage of postponement enables management to make greater use of aggregate forecasts.
- (d) The postponement strategy is beneficial to firms because it lowers production costs.
- (e) A high level of option contracts can decrease the level of inventory risk for a supplier.
- (f) Of the three distribution strategies we discussed in class -- direct shipment, warehousing and cross-docking -- the best fit for a product that's perishable is cross docking.
- (g) A quick response strategic partnership makes it more difficult for a supplier to make accurate forecasts and respond quickly to changing market conditions.
- (h) One reason that online grocers such as Webvan failed is that grocery inventory costs are extremely high.
- (i) Push strategies best take advantage of economies of scale in transportation and manufacturing.
- (j) Transshipment helps retailers take advantage of risk pooling without using warehouses.
- (k) It almost always makes sense to postpone product differentiation as late as available technology allows.
- (l) Long term supply contracts guard against price and shortage risk.
- (m) Cross-docking is easiest to manage and most effective if a retailer has few stores and low volume.
- (n) Mail-in-rebates allow firms to distinguish between customers according to their price sensitivity.

- (o) Vendor-managed inventory arrangements require the retailer to develop new inventory management skills.
- (p) It is generally very risky for a firm to outsource modular products for which the firm currently does not have enough in-house knowledge.
- (q) Strategic partnerships often lead to increased supplier expenses.

II. Briefly answer the following questions:

- (a) In class, we identified three approaches that a firm can use to procure commodity items. What are these three approaches, and how should the firm decide between or among them?
- (b) In class, we discussed the spectrum of strategic partnerships, from quick response (QR) to vendor-managed inventory (VMI). Why would a set of partners choose QR over VMI, or VMI over QR?
- (c) What is the difference between customized pricing and dynamic pricing? What problems or issues does customized pricing address? What about dynamic pricing?

III. A firm sells two products, the Gizmo-50, and the Gizmo-100. The Gizmo-100 is a version of the Gizmo-50 with a faster processor. Due to high stockout and inventory costs, the firm has decided to redesign the products for supply chain management, and is considering two strategies. If the firm implements a downward substitution strategy, it will only stock the Gizmo-100. If a customer orders the Gizmo-50, a shipping clerk will label the unit a Gizmo-50, and if a customer orders a Gizmo-100, the shipping clerk will label the product a Gizmo-100. Either way, the product will be shipped to the customer immediately. The products will be identical, except that a Gizmo-100 will be guaranteed to run at the faster speed. If the firm implements a postponement strategy, a generic Gizmo will be manufactured, and the shipping clerk will add a high speed or low speed processor to the unit after the customer orders, and ship the unit immediately. Note that the labeling in the downward substitution case, and the processor insertion in the postponement case, don't take very much time. However, implementing the postponement strategy will add one week to the product lead time, so that manufacturing lead time will increase from two weeks to three weeks.

If the downward substitution strategy is implemented, manufacturing cost will be \$95 per unit. If the postponement strategy is implemented, manufacturing cost for the Gizmo-50 will be \$65 per unit, and manufacturing cost for the Gizmo-100 will be \$105 per unit. The Gizmo-50 sells for \$130 per unit, while the Gizmo-100 sells for \$165 per unit.

The monthly demands for The Gizmo-50 and the Gizmo-100 are normal with mean = 100, st dev = 10 and mean = 120, st dev = 20, respectively, and the demands for the two products are uncorrelated. Holding cost is \$1 per month per product, and each time supplier \$\$\$ starts manufacturing a product, a fixed cost of \$148 (per product) is incurred. The firm uses a continuous review policy, and would like to maintain a 98% service level, which translates to a safety factor,  $z$ , of 2.05. (assume 4 weeks in a month) (24 points)

- (a) What is the expected annual profit if the postponement strategy is employed?
- (b) What is the expected annual profit if the downward substitution strategy is employed?
- (c) If half of the customers find out about the downward substitution strategy, by how much will this decrease the firm's profit? How can this problem be addressed?

#### IV. MODERN BOOK DISTRIBUTION, INC.

Richard Guy, CEO of Modern Book Distribution, Inc. (MBD) scanned the "Executive Summary" of the consulting report he had just received. Guy saw the report was filled with the latest buzzwords and hot concepts:

Establish cross-docking facilities for high-volume deliveries to large customers...  
centralize storage operations to decrease safety stock levels... leverage point-of-sale...  
data to move toward a pull distribution strategy...

Guy was familiar with all of these phrases and concepts at a superficial level, of course--- anybody who occasionally picked up The Wall Street Journal or Business Week would be. He was less sure, however, if the consultants were trying to dazzle him with fads or if the kind of radical operating changes that were being proposed in the report would help to position MBD for the future.

Founded 80 years ago, MBD had been for many years one of the largest book distributors in the country. From its seven regional warehouses, MBD services major bookstore chains and smaller independent booksellers throughout the country. The company had continuously strived to improve its service levels and operating efficiency, and it was considered the most efficient book distributor in the industry. Using advanced forecasting techniques to control inventory levels and technologically advanced warehouses to control operating expenses, MBD shipped virtually all of the orders it received within two days from its stock of nearly 500,000 books, the largest in the industry.

The bookselling industry, however, had been changing dramatically, and Guy realized that MBD would have to make changes to remain a book distributing powerhouse. In particular, two relatively new types of retailers were becoming more and more dominant

in the industry: large superstores, and online booksellers. Both of these categories of retailers presented new and unique challenges to their distributors.

In the past MBD had interacted primarily with the superstores through large regional distribution centers (DCs) that the superstores maintained. In general, MBD had shipped to the DCs consolidated orders of many different titles bound ultimately for many different stores. As these superstores learned from the experiences of large retailers in other industries, they started to demand new kinds of services from their distributors. For example, some retailers had started to strongly encourage MBD to ship directly to stores, bypassing the DCs. In addition, as the industry consolidated, these huge superstores were developing more leverage with their distributors. They used this leverage to force the distributors to accept lower and lower margins.

Online booksellers presented an entirely different set of challenges to Guy and the managers at MBD. Initially, these retailers kept no inventory at hand. Instead, they took orders and relayed them to distributors like MBD, who delivered the books to the retailers for repackaging and shipment. Recently, the large on-line retailers had started moving toward a new business model---they established their own distribution centers where they kept inventory and handled packaging and shipment of books directly to the end customers.

Guy realized that these industry changes could provide opportunities and challenges for his company. In particular, the new business model developed by some of the on-line retailers, in which they established their own warehouses, may cut MBD's profit margins. Clearly, if MBD was to maintain its reputation as one of the nation's leading book distributors, it would have to start doing things differently.

Furthermore, he had the consultant's report, filled with recommendations and designs for new distribution systems. Guy knew that he and his management team would have to develop an understanding of these issues in order to properly assess the consultant's suggestions. As he prepared for the next day's meeting, Guy began to make a list of questions.....

- (a) Why are superstores starting to encourage their distributors to ship directly to stores?
- (b) Why are on-line retailers establishing their own distribution centers?
- (c) How can MBD benefit from changes in the book distribution industry?