



# *Supply Chain Management Professional Education Review*

*A monthly e-Newsletter by the Department of Supply Chain  
Management and Marketing Sciences*

**June 2009**

## ***In this month's issue***

**Increasing profits** will gain the attention of senior leaders in all industries.

Professor Yao Zhao and Ph.D. Candidate Kathleen Martino examine current pricing methods in the pharmaceutical industry and propose a new method that will increase total supply chain profits. While their research is specific to a single industry, it has broader implications for all supply chain managers. ***How many of us have examined ways to increase the profit "pie" for all members in our extended, end-to-end supply chain?***

## ***Upcoming Events***

2009 SCM Fall summit meeting  
- Sept. 18 (Organization  
Transformation)

The Rutgers Center for Supply Chain Management is providing customized training for a U.S. manufacturing company, a Pharma R&D sourcing group and a global package delivery company. How can we help you meet your training needs in a cost effective way?

For more information, please go to [www.scm.rutgers.com](http://www.scm.rutgers.com) and click on our link to Executive Education.

## Training – Reinvigorate, Don't Curtail!

[Robert A. Rudzki](#) writes, “*Under the pressure of a weakened economy, companies will look to all forms of discretionary spending to reduce costs. Typically travel and training are at the center of the cost reduction bulls-eye. While there may be rational agreements for cutting back in these areas, cutting spending for all forms of training may be cause for problems.*

*Sourcing organizations will need to be well trained to handle the onslaught of expectations coming their way. For many, this will be their first experience in dealing with the challenges of a troubled economy. Cutting budgets for training ... may be the very essence of “pennywise and pound foolish.”*

At the Rutgers Center for Supply Chain Management, our mission is to ensure that you have access to cost-effective, world-class professional development programs. Our local presence helps you to get the best value for your development dollar. To learn more, visit <http://www.scm.rutgers.edu/ExecutiveEducation.htm>

Bob Rudzki is a former Fortune 500 executive and Chief Procurement Officer, who now advises other companies as President of Greybeard Advisors LLC, a strategic management consulting firm. He is author of several business books including the critically acclaimed *Beat the Odds: Avoid Corporate Death*, and also the book *Straight to the Bottom Line*. Bob is a frequent public speaker at conferences and events.



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# Opportunities in Pharmaceutical and Biotech Brand Drug Distribution

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*Kathleen Martino and Yao Zhao*

*Department of Supply Chain Management and Marketing Science*

A majority of the US pharmaceutical/biotech manufacturers distribute their products to retail outlets (e.g., pharmacies) through the Big Three distributors: AmerisourceBergen, Cardinal Health, and McKesson. In 2005, the pharmaceutical supply chain went through a drastic change from the dominating Buy-and-Hold (BNH) contract agreements (between manufacturers and distributors) to the Fee-for-Service (FFS) contracts. The change was initiated by the distributors and has had a widespread impact on the industry. Since its introduction, the FFS contract is under heavy debate and so far the outcome is unclear - especially given the emerging competition from the logistics service providers. Our objective is to provide some insights on the effectiveness of the FFS contract, and propose an alternative contract termed fee-for-distribution (FFD), which is practical and more mutually beneficial for both manufacturers and distributors in the U.S. pharmaceutical/biotech industry.

## **A Brief History of the Buy and Hold Contract**

In the buy and hold contract, the distributor purchased the drug from manufacturers at the Wholesale Acquisition Price (WAC) and sold it to pharmacies at the Average Wholesale Price (AWP). The AWP is the sticker price that distributors charge pharmacies for a drug. This price is publicly available data and serves as a benchmark, although many large purchasers receive a discount off this price. Similarly, the WAC also serves as a benchmark in the pricing contracts between manufacturers and distributors.

For brand drugs, historical data shows that the WAC has always increased. In the Buy and Hold contract, distributors frequently participated in forward buying by purchasing inventory at a lower price and selling it to the retailers after the manufacturer increased the price. In fact, forward buying has been a primary source of the distributors' profit under the buy-and-hold contract.

The Buy-and-Hold contract had many drawbacks including counterfeit drugs, accounting scandals and a lack of transparency in the supply chain. Since distributors bought more drugs than they needed to satisfy demand, the excess inventory remained in the supply chain for an extended period of time, causing problems for tracking and providing a chance for counterfeit drugs to enter the mix of prescription drugs. Second, forward buying also led to accounting scandals in which manufacturers pushed large amounts of a

drug into the distributor's warehouse to artificially boost quarterly revenues. For instance, the SEC questioned Bristol-Myers Squibb in 2004 about their reported earnings as a result of pushing products into distributors' inventories. They paid \$150 million to settle the case in which the SEC accused them of "manipulating its inventory of drugs to inflate earnings and meet Wall Street targets." (The Boston Globe, 5 August 2004). Finally, the bolstered inventory levels of the distributors caused demand for the product to be highly skewed and misled the manufacturers in production-inventory planning. When forward buying becomes the norm, the distributor buys excessive amounts of the drug from time to time. As a result, the distributor's buying pattern does not accurately reflect that of customer consumption.

## **The Fee for Service Contract**

To resolve the problems caused by the Buy-and-Hold contract, the government issued new laws to regulate the industry. The Sarbanes-Oxley Act of 2002 restricted the amount of inventory that the distributor can carry to at most three months. The distributors responded to this regulation by introducing the Fee for Service (FFS) contract to partially compensate themselves for the lost revenue due to forward buying. The FFS contract differs from the Buy-and-Hold contract in that the manufacturer is asked to pay the distributor a set fee for services.

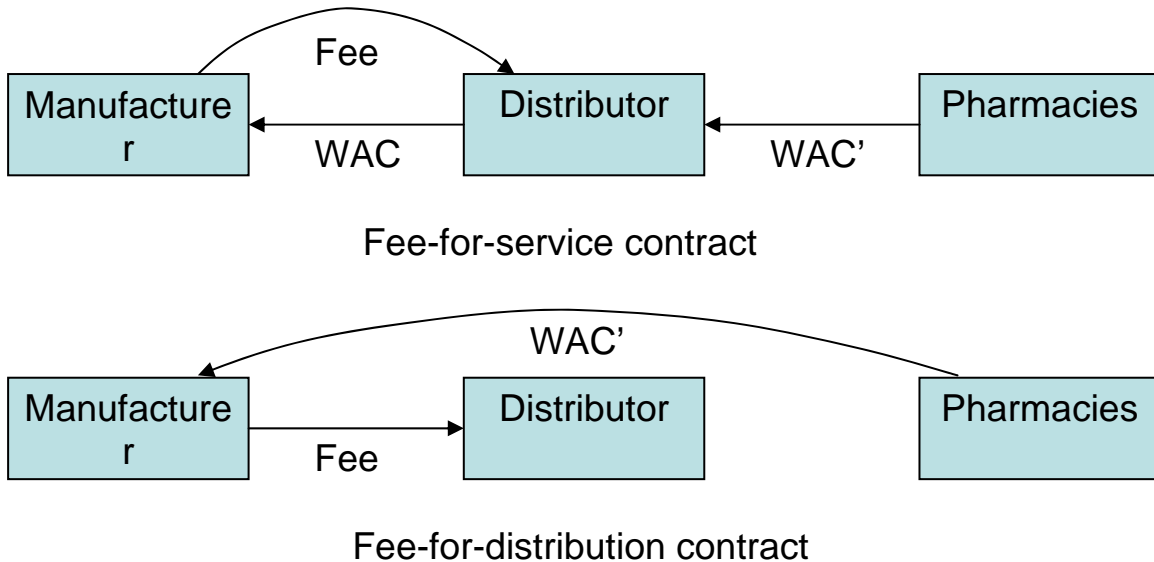
Manufacturers are realizing decreased margins because they are now paying the distributors a fee for services that they previously received for free. As a result, unhappy manufacturers began to look for alternative sources of distribution, such as 3<sup>rd</sup> party logistics service providers. This need provides an opportunity for logistics service providers such as UPS Supply Chain Solutions, who prosper in this industry because the technological advances have lowered the market entry barriers. Because the current FFS contract poses these challenges to both manufacturers and distributors, many industry experts acknowledge that the current FFS model is not a sustainable business practice.

## **A Proposed New Contract**

We propose a contract which we call the fee-for-distribution (FFD) contract, to streamline the relationship between manufacturers and distributors in the pharmaceutical industry. This contract resembles the incentive structure implemented by logistics service providers, such as UPS and FedEx, and thus is implementable and practical in the business world. This contract differs from the current FFS contract in two primary areas: the ownership of the drug and the flow of money in the supply chain.

In the FFS contract, the manufacturers sell the drug to the distributors, who then sell the drug to the retailers. In the FFD contract, the manufacturers maintain ownership of the brand drug throughout the supply chain until it reaches the retailer. The distributor is compensated by the manufacturer for distributing the drug, at a specified service level, while the manufacturer receives revenue from the retailer. Figure 1 provides a graphic comparison of the money flows between the two contracts.

**Figure 1: Money flow under FFS and FFD**



## The Model and Numerical Findings

We consider a typical supply chain with a manufacturer and a distributor. We assume that the manufacturer and the distributor produce and distribute brand drugs over a finite time horizon and that the prices of the drugs are increasing over time. As we look at pharmaceutical drugs that are patent-protected, there are no substitutes or generic drugs available to the consumer; it is presumed that as time increases there is an increase in demand for the drug, which leads to a price increase. Empirical data is consistent with this reasoning, see the report of Booz-Allen-Hamilton (2004). The report also explains that the price increase is not explicitly announced; however the distributors can anticipate the date and the extent of the increase with relatively high accuracy. Thus, we assume price is predictable in this paper.

We consider brand drugs with predictable total U.S. demand. We assume that the manufacturer and the distributor know the external demand for the time horizon, and both the manufacturer and the distributor are rational, i.e., making decisions to maximize their expected profit.

Data was collected in cooperation with a major US drug manufacturer, a distributor, and a retail pharmacy chain. We consider a 24-month planning horizon and the pricing structure of three brand drugs that do not have generic substitutes. We identify the fee that distributors charge the retailers under the fee-for-service contract ranges, typically ranges between 3%-7%. This fee is based on a number of factors, including the size of the manufacturer and the complexity of the drug-handling requirements (i.e. climate controlled distribution). We also were told by the manufacturer that the pharmacies typically receive a discount off of WAC, which can range from 1%-3%. The WAC

prices were provided by the pharmacy, and predictably change at the beginning of the year. The demand for the drugs was provided by the distributor. The annual holding cost for manufacturers is 8% of their production costs; the annual holding cost for distributors is 8% of WAC. Production costs for the manufacturer are between 15%-20% of WAC for brand drugs. All of the information in the above paragraph was provided and confirmed by the manufacturer, distributor, and/or the retailer.

Figure 2 illustrates the effectiveness of the fee-for-distribution contract relative to the Fee-for-service contract. It shows that the fee for distribution contract outperforms the fee-for-service contract by about **\$26 million** in terms of total supply chain profit for the three drugs over a 24-month period (from July 2006 to June 2008). Taking cost of goods sold, logistics, R&D and administrative costs into account, the fee-for-distribution contract increases the total supply chain profit by about **2.72%**. For a complete explanation of the manufacturer's and distributor's optimal production and ordering levels, as well as their individual increased profit levels under the FFD contract, we refer to the full paper.

**Figure 2: Total Supply Chain Profits**



## Contract Comparison

The fee-for-distribution (FFD) contract outperforms the fee-for-service (FFS) contract for the entire supply chain because the total revenue of the supply chain remains the same under both contracts, but the total cost is lower under FFD. The supply chain cost is lower for two reasons:

- First, the distributor's incentive to forward buy is completely eliminated under FFD and their inventory level is minimized. Indeed, under FFD the distributor will only carry enough inventory to satisfy demand in each period. In contrast,

the FFS contract may motivate the distributor to carry up to three months of investment inventory.

- Second, the bullwhip effect is reduced and the manufacturer faces a smoother order stream from the distributor under FFD. As a result, the manufacturer can better plan for its production and inventory.

Thus, the total supply chain cost will decrease and the overall supply chain profit will increase as one moves from FFS to FFD. The manufacturer and the distributor can negotiate the fee structure to split the additional profit in any way they prefer.

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