

## Designing Deals to Improve Demand Forecasts



By **Karan Girotra** , INSEAD Associate Professor of Technology and Operations Management

### **Why supply chain partners rarely collaborate to reduce demand uncertainty, and what can be done.**

A lot can go wrong when a complex supply chain meets unknown consumer demand. For example, Xiaomi nearly became the victim of its own success when it entered the Indian market in 2014. Partnering with India's online emporium Flipkart, the company tried to replicate the success it enjoyed in China with low-volume flash sales. But Xiaomi sorely underestimated Indian consumers' appetite for budget smartphones. A bilious backlash broke out on social media among hordes of would-be buyers who could not get their hands on a phone. Hemmed in by a three-month production cycle, Xiaomi was forced to suspend sales of some models.

Xiaomi found its groove in India with admirable speed: As of summer 2017, it was second only to Samsung in smartphone shipments. Still, it could have made a more graceful debut. Surely, Flipkart—with its intimate knowledge of the market—could have given Xiaomi a better idea of how strong demand for its product would be. But Flipkart presumably had no incentive to do so. Companies are not charities. They won't go to the trouble of acquiring and consolidating demand-relevant information without strong incentives.

Or consider the production of flu vaccines. When production begins around the start of the calendar year, vaccine manufacturers can only guess which flu strains will spread or what the final demand will be. A wrong guess can result in vaccine shortages (when supply falls short of demand), or a glut of unused doses (when supply exceeds demand). As with Flipkart and Xiaomi, retailers—government agencies, clinics, large grocery chains, etc.—usually have more access to knowledge about the demand for vaccines than manufacturers. But this valuable knowledge will remain unmined unless the vaccine producers strike some sort of deal with retailers.

What might such a deal look like? One possible model is the *advance purchase discount* (APD), in which purchasers (in this case, retailers) receive lower prices if they order well in advance. Wholesalers can use the advance orders as a preview of broader demand, and make production choices accordingly. APDs between retailers and end customers are common. In recent years, PayPal and other innovations have made preferential payment schemes even easier to implement. Yet advance selling collaborations among supply chain partners are still relatively rare. In a recently published paper in *Production and Operations Management* (co-authored by Wenjie Tang of NUS Business School), we explore the obstacles specific to retailer-wholesaler APDs and suggest ways of overcoming them.

### **Misunderstood costs**

APDs theoretically enable whole supply chains to benefit from the homework—canvassing customers, reviewing past demand levels, etc.—retailers will do before placing anticipatory orders. But wholesalers often overlook the costs retailers incur in the process. Every retail partner will have its own needs and capacities that wholesalers are not necessarily privy to.

Moreover, retailers will differ in their tolerance for sharing the risks of demand uncertainty with wholesale partners. The further in advance an

order is placed, the greater the risk of misjudging eventual demand. The safer bet is always to wait and see.

The above two elements—risk tolerance and costs—largely determine a retailer’s receptivity to APDs. Neither is visible to supply chain partners, unless the retailer volunteers information about them. Left in the dark, wholesalers are likely to propose discounts that are either needlessly high (hence damaging to their margins), or too low to interest retailers.

### **A model for APDs**

How, then, should supply chain partners proceed towards a deal? We built a theoretical model (calibrated on real industry data) simulating a typical APD, in order to find out which sets of conditions produced mutually beneficial outcomes for both parties.

In an ideal world, wholesalers would be able to gauge retail partners’ minimally acceptable discount (MAD) with a high degree of accuracy, thereby securing retailer cooperation at the least possible cost to themselves. However, barring an unusually open relationship with the retailer, wholesalers’ attempts to calculate MAD will be clouded by some amount of uncertainty. According to our model, if the retailer’s hidden costs are not factored into such calculations, the proposed discount will fall below the retailer’s MAD and won’t be accepted.

Therefore, wholesalers must select from a range of discount options whose size corresponds to the level of cost uncertainty. More uncertainty leads to a broader range of options, and vice versa. The chief question, then, is whether the optimal discount for all concerned is likely to be found at the lower end of the range, or the higher. Our model revealed that in relatively low-uncertainty situations, a higher discount should be offered to sweeten the deal for the retailer. When uncertainty runs high (i.e. not much is known about the retailer’s costs), wholesalers should protect their profit margins with a low-end offer.

Retailers have a part to play too, our findings suggest. If retailers were more forthcoming about what it would cost them to supply the desired information—containing the wholesaler’s uncertainty about costs—they would likely receive a better deal (i.e. a deeper discount). At the same time, they would be wise to retain some mystery, lest their MAD become readily apparent. A small-to-moderate amount of uncertainty seems to be the most

favourable precondition for striking APD deals.

We performed a subsequent numerical study to illustrate our findings. The results suggest that wholesalers have much to gain from APD schemes. Across all our results, we found that “successfully implementing the APD scheme allows the wholesaler to increase its profit by 3.5 percent on average”, as we wrote in the paper.

## Relationships

APDs probably work best in the context of a fairly time-tested and trusting relationship between supply chain partners. Especially close partners might not even need an incentive such as a discount to share information and demand-uncertainty risks among themselves.

Yet the realities of doing business tend to discourage collaboration along the supply chain. For example, relatively small suppliers of commoditised products have almost no leverage in dealing with major retailers such as Walmart. This gives rise to highly transactional relationships and near-total flexibility for the more powerful partner. Conversely, more equitable partners—Apple and long-standing supplier Foxconn, for example—could certainly profit from deepening an already-existing collaboration, even if it meant foregoing some flexibility.

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