Hospital Supplier Managed Inventories (SMI) and Supply Chain Power

Today approximately 25% of hospital costs are supply-related. Healthcare supply chains are fragmented. Manufacturers, distributors, group purchasing organizations (GPOs), and providers largely operate independently from one another. The supply chain is often characterized by forward buying in anticipation of price increases. There is little upstream demand signaling.

Hospital supply chains need to move toward an integrated demand-driven model, so that manufacturers have much earlier visibility into actual consumption. In many other industries, this integrated supply chain system has enabled the participants to align production and distribution much more closely with actual demand.

Increasing competition and the rapid adoption of advanced information technology has prompted hospitals and their suppliers to reengineer their supply chains and examine collaborative supply chain efforts to reduce costs and improve efficiency. Supplier-managed inventory (SMI) has emerged in this context as an initiative that takes the collaborative efforts beyond information sharing and allows the supplier to exercise some amount of control on the actual inventory levels at the hospitals.

In this research, we assume that the vendor (supplier) can project what costs (average per year) the hospital will incur under its alternative method of sourcing. To win a specific contract, the vendor must offer an acceptable contract whose total expected annual cost to the hospital is less than the alternative by an amount M. Note that we do not assume M ≥ 0; if the alternative to the SMI vendor is for the hospital to manage its own inventory through a GPO, the SMI supplier may represent an opportunity for the hospital to reduce staff and its dependence on GPOs.

The SMI vendor will need to compute supply costs for the hospital at the item level, both to project the hospital's annual costs under the alternative and to project them with the SMI vendor. This approach allows the hospital the ability to negotiate contract parameters (such as service levels and discounts) at some aggregate level, however, because negotiation at the stock keeping unit (SKU)-level would be too difficult. The SMI vendor will make ordinary replenishments (as opposed to stockout remediation) at the bundle level, but negotiations need not be based on the bundles. In other words, the SMI vendor need not quote the same discount on every item in a bundle, nor does the service level need to be the same for every item in a bundle. Bundling here is strictly for replenishment. We assume that the hospital unilaterally sets cycle service levels (from which safety stock will be computed), presumably at some aggregate level, at the bundle level. Giving the hospital final say on service levels reflects the fact that stockouts may have significant medical implications. The SMI vendor, during negotiation, can provide sensitivity analysis showing the hospital the impact of modifying proposed service levels. We also assume that the stockout costs reflects an agreed upon remediation mechanism, which may vary by SKU or SKU group. We do not assume that remediation occurs by bundle. Bundling pertains only to ordinary replenishment. Finally, we do not presume any preordained split of stockout costs. Rather, we consider that to be a variable (at the item level) to be negotiated.
In the formal model the SMI vendor is required to organize replenishments on the basis of bundles of SKUs. (Hypothetically, the model accommodates bundles of size 1; most items will likely be folded into larger bundles.) The SMI vendor uses an \((R; S)\) inventory system with the order-up-to quantity \(S\) set at the SKU level but the replenishment cycle \(R\) set at the bundle level.

The preliminary findings are promising. In general the results are promising for the buying organization (hospital). Specifically, preliminary results show that hospitals can unilaterally determine service levels. Service levels specified in the SMI contract can be easily compared to service levels used to compute the hospital’s best alternative cost.