Inventory management at HealthCo

Company background

HealthCo is a large, national distributor of Medical Supplies. HealthCo's customers are mainly hospitals, doctor offices, outpatient clinics and Managed Care facilities. HealthCo has, over many decades, made itself a name by providing good service and a fully integrated product line. The vast majority of customers has been accustomed over the years to expect next day service across pretty much the entire product portfolio. Customers tend to place their order in the afternoon and receive deliveries in the first half of the following business day.

To enable this service, HealthCo operates a large network of distribution centers (DCs) all over the nation. The number of DCs is determined by the need to provide deliveries in the allowable 12-24 hour time window, i.e., they have to be close to the customers. Deliveries are handled by leased trucks (dedicated lease, which allows HealthCo some control over the drivers and enables showing the company logo on the side), that leave the DC in the early morning and follow standardized routes, as most customers receive deliveries every day – in particular hospitals try to minimize using their expensive real estate for storage.
In addition to the local market DCs, HealthCo operates also a few larger DCs to hold backup inventory or consolidate purchases from many vendors.

Product portfolio

The product portfolio of HealthCo is incredibly broad, and the product characteristics vary widely, except for the common requirement of next day delivery.

It is important to understand the enormous range of the offering:

- HealthCo stocks well over 100,000 Stock Keeping Units (SKUs)
- On one hand HealthCo distributes bulky or heavy and inexpensive items such as paper hand towels and basic saline solutions for <$20 per case/container, while on the other extreme, sutures (kits for wound closure) can easily cost several $100, while weighing less than ½ ounce.
- Many items have very large volumes with steady consumption, as they are routinely bought by most customers, e.g., alcohol pads, bandages, scalpels. Yet other items may sell only to a single customer (because HealthCo is committed to offer any SKU that any one of its (meaningfully) large customers demands). For instance, a doctor in one particular hospital may require a special surgical kit (say, a packaged unit of multiple items needed for a specific surgery, e.g., a tonsil removal), that on top is sold only in small quantities. Many items sell less than a few units/month!
- Certain items can be highly volatile, e.g., items related to flu and cold treatment can see their demand spike heavily if the flu season is particularly bad or a scare such as SARS happens.

- Given volumes and the size of its business, HealthCo orders weekly from most suppliers for each DC. Most suppliers ship immediately from their own stock, and deliveries are received within a couple of days. However, the whole range exists. Some specialized items may require months of supplier lead time to receive an order, in other cases, suppliers may have quality issues (e.g., failure of sterilization tests) and can be without stock for months.

The need for better inventory management

Given the product complexity, inventory is being managed primarily through an enterprise IT system using standard algorithms (e.g., the SAP or Oracle Supply Chain modules). In addition, HealthCo employs a large number of planners to watch the inventory positions to intervene when issues arise. In addition, DC managers have a substantial degree of discretion to override orders.

Overall HealthCo has managed to deliver a service level of 97% (measured as line-fill, i.e., the percentage of order lines that can be filled in full on the next delivery).

But overall industry competition is increasing and HealthCo would like to deliver a better service level overall. At the same time, there is pressure on the overall company from the market to improve performance and gross margins are shrinking, so the Supply Chain team has been tasked to reduce inventory in order to shrink overall capital requirements.

The leader of the Supply Chain Special Projects team, Toni Morgan, has been tasked to identify inventory management strategies and targets to deliver on these goals. Toni is beginning this task by studying a set of representative example SKUs and does so within the service area of one DC, arguing that because of the customer requirements each DC requires an independent inventory per SKU.

Questions:

1) *Scalpel blades*: Most customers buy scalpel blades and Toni begins her analysis by examining this common SKU. The DC ships on average 341 of boxes of this blade per day, typically 1 box per customer. The volatility is quite low, the standard deviation of demand being 38 boxes per day. A box of blades cost $20.

    a) Scalpel blades are bought from one supplier, who provides many other SKUs. The supplier ships daily. Any quantity can be ordered, but only multiples of full pallets (2400 boxes per pallet) receive the negotiated price, other quantities incur a 3% surcharge. If you assume no 'per order costs' (typical) and a capital/storage cost of 10%, what is the economic order quantity for this scalpel blade? What order

quantity would you recommend?

b) Assuming that Toni is targeting a 98% *cycle service level* and that a replenishment order can be filled within 7 days (an order can be placed any day of the week). What is the resulting safety stock? What is the overall average inventory?

c) At this point, HealthCo uses a standard strategy of '2 weeks safety stock' (this is still a very common approach). What percentage of inventory could HealthCo save for SKUs that behave like this scalpel blade?

2) A special antimicrobial bandage has a demand of 614 units per month. They are sold individually or in boxes of 800 at a much lower price. The standard deviation is 810 per month. However, this item can be quickly replenished – within just one day!
   a) What does the standard formula suggest as the safety stock target for a 98% cycle service level?

   b) What would the current IT system suggest at the standard 2 weeks of supply safety stock?

   c) Consider the Excel file that shows order data. What do you think is actually happening? What would you suggest that Toni analyze next?

3) A custom surgery kit that has been designed by an orthopedic surgeon is ordered 3 times per year. Custom surgery kits are assembled from standard parts in a sub-operation with a lead time of 1 week. How should Toni manage and optimize this inventory?

4) A rarely used suture sells only 20 individual units per week, with a weekly standard deviation of 10. HealthCo has to buy them from the supplier in boxes of 500 with a lead time of 1 week. How should Toni think about safety stock to make a 98% *fill rate* (not cycle service level)?

5) (optional – Extra credit) Looking at the scalpel blades of question 1: While that supplier takes orders daily, most other suppliers have an agreement for only one order per week at a fixed day, say Tuesday. Any received order is delivered on the Tuesday thereafter. If the blade supplier used this strategy, what would the required safety stock and the total average inventory be?