Supply Chain Design at AutoCo

This case references the automotive parts industry discussion from class, please refer to those materials for understanding the customer needs, typical products & typical parameters of the Supply Chain.

Also, this case involves only approximate math similar to what we did in class. Please document your thinking and your answers clearly, this is much more important than getting the numbers exactly right.

If you need a number but feel you don't have it, make the most reasonable guess that you can think of. Depending on your assumptions, you may get to different answers – that is ok, we are interested in the quality of the thinking behind the math, not the exact answer. For our benefit, please state your assumptions clearly. In addition to noting the important drivers, if you choose to ignore a factor because it is not important in your view, please state what you left out and why.

After doing such a great job at HealthCo, Toni has taken a new position with a well-funded new company, AutoCo.

AutoCo wants to play in the automotive parts space and become a major competitor to Autozone, Advance Auto Parts, O'Reilly and the other players. Thanks to private equity funding, Toni gets to design and build an optimal Supply Chain infrastructure – no attention needs to be paid to legacy buildings, IT systems, etc.

Toni has already designed a national store/professional service local footprint and arrived at a similar footprint and type of in-market facility as the current national players – typical stores of 7500 sqft, with a couple of drivers and delivery vans, servicing both retail as well as the professional market.

1. **Assortment choices in the local stores**: Toni will obviously stock all the frequently needed retail and professional parts – air filters, brake pads and discs, etc., same as all the other players. However, she is thinking about offering a broader range of products. E.g., the Coral Gables location serves a fair number of repair shops that service very unique cars, such as Professor H's 1994 Ferrari 348. She is therefore considering how to think about stocking a part locally. For such parts, Toni anticipates a 40% profit margin and no holding costs other than capital costs at 15% per year.
   a. What is the item velocity (or demand rate) at which it becomes profitable to stock the item locally?
   b. Professor H has to replace a $1000 brake cylinder on his Ferrari every 3 years. His is the *only* car in the area that uses these brake cylinders in the area. From an overall Supply Chain perspective, discuss under **which conditions you would**

actually stock the cylinder locally and under which you might not - and what you might do instead. Give some examples with assumptions and numbers for the different choices, assume the EOQ from the manufacturer is 1 unit and the lead time is a couple of days (if you need to).

2. **Distribution center network**: The existing national players seem to have a lot of distribution centers. Some have 25, some have over 50. Toni is wondering whether that is the right economic choice or whether that is a legacy issue (many of the existing players were created through mergers of smaller distributors)

   a. What are the tradeoff factors you would be considering for the network design? Which ones would you estimate are the dominant ones?

   b. Estimate **crudely** how many DCs you would need in the in the continental United States (no Hawaii, no Alaska) to serve most stores in one day (say 8 hours driving time). How many DCs roughly would you need for 2 days (16 hours driving time). Don't go overboard, if you can't reach the middle of Wyoming in 8 hours, that's not a big deal. Google Maps can be helpful

   c. With your answer in part (b), would you build a DC network that can serve stores in one day? Or rather 2 days? To justify your choice, consider the following numbers: O'Reilly as per annual report has ~5000 stores, 27 DCs, about $9bn in revenue, and maybe $7bn in inventory (roughly estimated), you can assume that ~60% of the inventory sits in stores, assume fixed cost for a DC to be ~$7m – DCs are expensive. Assume as in class that we are delivering with a truck per 12 stores, 3x a week, with a cost of $1000/truck-day. Assume that AutoCo will be as large as O'Reilly and incur an overall carrying cost of 10% per year.

3. *Design choice for batteries*: AutoCo will sell car batteries from just one national supplier. Batteries are very heavy (40 lbs each), reasonably cheap (cost of $50) and stores sell a lot. A truck can only carry 24000 pounds or 600 batteries, so a truck completely *weighs out.* If the average store sells 5 batteries a day, what flow would you design for batteries?