

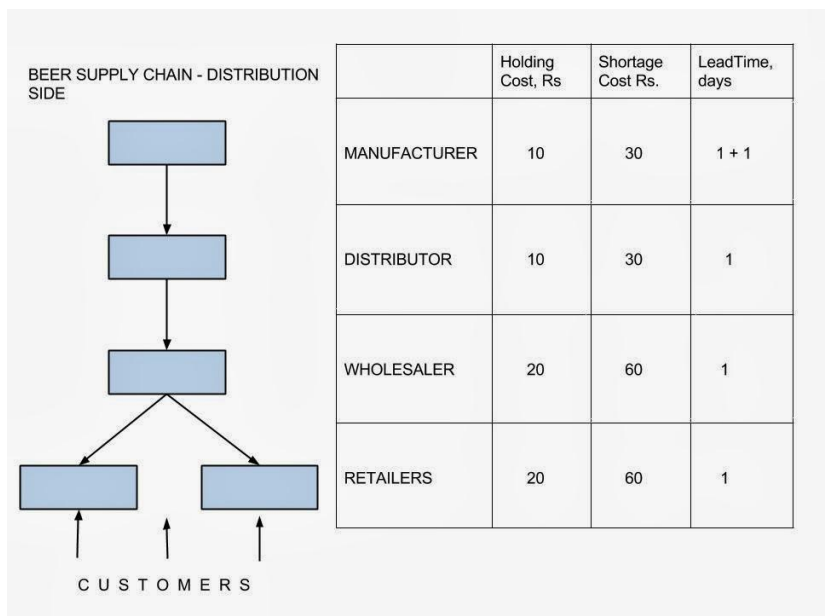
BEER GAME WRITE-UP

Abstract : The Beer Distribution game is a management simulation game played for the participants to get a grasp of supply chain distribution side dynamics of a make-to-stock beer distillery supply chain. The game which originated in MIT in the 60s is very popular and can be suited to be played for any manufactured item which is a make to stock item.

The game is played like this.

The distribution side of the supply chain has customers, retailers, wholesalers, distributors and the manufacturer. For example a distribution chain may have two retailers who are being supplied by two wholesalers who in turn are being supplied by a distributor and in turn by the manufacturer. **All the players in the chain have their own stock of initial inventory, respective costs of holding and shortage for the inventory and the corresponding lead times of replenishment.**

The moment a downstream entity, for example a retailer places an order on the wholesaler for stock, when he has already run out of stock or will soon in the near future, the wholesaler does not immediately replenish the retailer. Instead, depending on the lead time of replenishment for the wholesaler, the wholesaler replenishes the stock after those fixed time periods. During this time period the retailer has to wait and continue incurring the shortage costs. If the wholesaler does not have enough stocks to replenish the retailer with, he places order on this upstream entity, ie distributor and waits for the lead time period of the distributor to get stocks for him. From this stock he tries to replenish the retailer.



ALL UNMET ORDERS ARE BACKORDERED, ie. met in the subsequent periods when there are enough stocks with the upstream entity.. The customers who are in direct contact with the retailers place orders with them and are immediately satisfied or replenished. The presence of lead-time for replenishment of stock and backordering, adds complexity to the game. The presence of holding costs for excess stocks and shortage costs for short stocks, leads to the entity incurring costs during each cycle of the game.

The game is played for a fixed number of cycles, approximately ten to fifteen, for different customer demand patterns and the total costs incurred by each of the entities is added to get the total supply chain costs. There will be two or three teams playing the game and the team which scores the minimum total costs are the winner for the day. During the entire duration of the game, the entities do not share their ordering or demand pattern with entities upstream or downstream.

A tabulation is made (in the sheet provided) of the costs incurred and the variance of the orders placed by each of the entity on the entity upstream, is found out. Calculate the mean of the orders and the summation of the square of the deviations of each of the order placed with the mean order size, divided by (n-1) where n is the number of times orders are placed or cycles played.. ([click here](#))

Importance of post-game discussions :

The last 30 minutes of the game is for discussion of the findings and the variance related discussions, which will help throw light into the distribution side dynamics.

This brings in live interpretation of concepts like a) **Lead time** (both transportation and manufacturing), b) **holding costs**, c) **shortage costs**, d) **obsolescence costs**, e) **role of different players** in the distribution side of the supply chain, f) **how costs and variances are calculated** and finally g) **how variance amplification**, commonly termed as the **Bullwhip effect**, is observed in the game.