Goldratt's TOC Golden Nugget #4

Eliyahu M. Goldratt © 2009

Inventory target: asymmetric time constants

(MTA; Production)

When experiencing a decline or increase of consumption for an SKU, the inventory target should be changed accordingly. But many times a change in consumption is merely a statistical fluctuation and not a trend, and therefore should not trigger an inventory target change. Trouble is, when experiencing a lower or higher consumption, we cannot foretell if it signifies a long term change that requires action (changing inventory target), or whether it is just a fluctuation.

We want to react quickly to real changes, but not to noise: If we react too fast, many noises will be treated as real changes, and we will cause undesirable oscillations in the system – frequent changes of the inventory target, back and forth. On the other hand, if the reaction will be delayed, the system will meanwhile suffer from either too high or too low inventory levels. Obviously, we need to decide on a suitable time constant for responding to change – determining for how long should the buffer stay red\green before we react by changing the inventory target.

Up to this point we described nothing new. We already use such a time constant – the default is the replenishment time. If for the lion's share of a time interval equals to replenishment time the inventory stays at the red – we raise the inventory target, and if at the green – we lower it. But should we use the same time constant for both raising and lowering the inventory target? The answer should depend on the level of damage caused by not reacting fast enough. In the case where we consider decreasing the inventory target (due to a stay at the green), the damage in reacting too slow is holding, for a while, too high inventory; whereas in the case where we consider increasing the inventory target (due to a stay at the red) the damage in reacting too slow is potential lost sales – a much worse outcome.

This asymmetry in damage should be reflected in our responses: the response to a red buffer (raising the inventory target) should be faster compared to the response to a green buffer (lowering the target). If the time constant for increasing the inventory target equals to replenishment time, for decreasing it, a time constant of twice the replenishment time is more appropriate.

Note: for SKUs which might become obsolete (products having short market life like fashion, electronics, etc.) the risks are more symmetrical, hence there is no need for two different time constants.