Theory of Constraints

All about Goldratt's Theory of Constraints, applications, stories, successes and challenges, and open dialogue on this powerful methodology for improving almost any kind of system. Particular focus on applications in Project Management, Manufacturing and Distribution.

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Product Octane: the overlooked lever in TOC

It has always amazed me that more companies are not capitalizing on the leverage of the concept of product octane in driving higher profits. Octane is Goldratt's concept of calculating the Throughput per time of your constraint. Thousands of people over the years have been introduced to this concept through the famous PQ quiz, and the Socratic simulator tool used in so many TOC workshops yet the penetration of this simple yet enormous powerful concept is very low.

The concept is pretty straightforward. Given that you have a constraint resource that limits your system from producing more and more Throughput, the aim is to generate not just more product volume through it, but really more dollar volume for every minute of this constraint. Some products may generate more overall Throughput, but take much longer at the constraint. Consider the following data on two products, from Goldratt's PQ exercise:

Product P Product Q
Selling Price $90 $100
Raw Material $45 $40
Throughput $45 $60
Time at Constraint 15min 30min
T/ constraint time $3/min $2/min

It is clear that in the same 30 minutes of constraint time you can produce either two P's or 1 Q. While Q has a higher T/ unit, considering that the constraint limits your output, producing the two P's produces 50% more T than producing the Q's.

What makes this even more interesting is when you consider the standard cost view of P and Q. P takes a total of 55 minutes of labor to produce, and Q just 50 minutes of labor. This means the labor (and overhead) costs assigned to Q will be smaller than those of P in standard (or ABC) costing. So every cost system in the world will show Q as the better product. The reality, as is shown very nicely by the exercise, is that companies will make much higher profits (by 50% in this case) if they sell P's instead of the "higher margin" Q's.

The exercise shows the principle, but the reality for mist orgainzations is typically much more lucrative. We have done an analysis of the portfolios of more than 100 companies over the years to calculate the octane of all of their products. The spread between the highest and lowest octane products has never been smaller than 2x, and is usually between 10x and 20x. Meaning the lowest octane products produce 1/10th of the T/hour of the highest. Assuming that we look at an hour's worth of time at the constraint, the high octane products would produce **10 times** the Throughput of the lower octane products.

More often than not most of the highest octane products are the ones with the lowest margins. And since most sales people and executives focus on margins, it also means that they are the products receiving the least attention from sales. Many times it happens that a company is the process of getting ready to trim these products from their portfolios as poor performers. When they realize that these are actually the gems in their portfolios they start to re-think their strategy.

It is not hard to calculate that shifting even a portion of the company's sales from the low octane (maybe high-margin) products to the higher octane products will produce a very large increase in revenues and profits. This analysis also creates the opportunity for companies to set their prices in a way that drives more of the high octane business their way.

Consider that for low margin products, companies will want to increase prices, this will naturally drive demand away from the company. But if these products that are considered low margin turn out to be very high octane relative to the other products, there is actually the opportunity to lower prices (which will reduce the octane as well) enough to drive more volume of these products their way, and still maintain relatively high octane.

This simple principle seems to have been lost from many TOC practitioners and companies who have deployed the TOC methodology, yet it holds the potential to rapidly increase profits without requiring new capital or labor. If you have any doubts about it, try it with some of the products in your company. Calculate the Throughput for a number of products (selling price minus material, outside services and commissions) and divide it by the amount of constraint time the product needs. You should see a spread of at least 2x, and probably closer to 10x, between the highest and lowest octane products.

To see just how much of an opportunity your company is missing, check the margins for these products as well. If there are some items with high margins that are low on the octane scale, or with low margins that are high on the octane scale, it means that there are significant opportunities to accelerate profits quickly. From my 20 years experience, I'd be very surprised if you found there weren't any opportunities...

Posted by kevinffox at 2:28 PM

Labels: ABC, constraint management, Goldratt, Product costing, Theory of Constraints, Throughput accounting, TOC