

TOC and the 5 focusing steps – by Philip Viljoen

Abstract

The five focusing steps of the Theory of Constraints have been successfully applied to the improvement of the Throughput of many operations, delivering operational excellence in most cases. In this paper the process is applied in order to establish and sustain a market bottleneck, the primary demand that a business needs to satisfy very well. Each step of the focusing process is discussed in some detail for this application. A case study is presented to illustrate the results of managing the flow to the market through the application of the Theory of Constraints.

Introduction

The concept and management of a bottleneck is the central idea of the book "The Goal" written in 1984 by Dr. E. M. Goldratt. In the book Jonah (the wise unorthodox professor) leads Alex Rogo (the factory manager) to discover how to manage the bottleneck in his production process. Through the guidance of Jonah and the thinking and experimentation of Alex, the concepts of the Theory of Constraints are discovered.

In this book, and a subsequent book (The Haystack Syndrome, 1990), the three financial measurements for any business are introduced. These are Throughput, the rate at which the system generates money through sales; Inventory or Investment, all the money the system invests in purchasing things that will be sold again; and Operating Expenses, all the money spent to turn Investment into Throughput. Maximizing Throughput while simultaneously reducing or controlling Investment and Operating Expenses is the responsibility of the management of a business. It implies a focus on improving the top line of the business that automatically leverages a dramatically improved bottom line.

The system's constraint(s) or in some cases the bottleneck, are defined as those few links in a chain that determine how much Throughput a system or flow can deliver. This clarifies the focus point for the system as a whole in order to realize significant improvement.

The management process developed in these books provides the means to achieve sharp focus:

1. Identify the system's constraint.
2. Decide how to exploit the system's constraint.
3. Subordinate everything else to the above decisions.
4. Elevate the system's constraint.
5. When in any of the previous steps the constraint is broken, go back to step 1. Warning, do not allow inertia to become a system's constraint.

This process is known as the 5 focusing steps.

Applying these steps in the factory depicted in "The Goal" lead to volume and consequently Throughput increases to the extent that their back orders were wiped out. They did not have enough orders to load the bottleneck fully. The bottleneck was idle from time to time, thus ending its status as a bottleneck. What was, in fact, limiting the performance of the business was a lack of orders. The demand for the factory's products became the new system's constraint. The original factory bottleneck is now merely the heaviest loaded resource and is no longer the system's constraint and is now called the Capacity Constrained Resource (CCR). Although it no longer determines the performance of the business, it cannot be ignored. More than one CCR can exist in a flow to the market, but care needs to be taken to ensure that CCR's are not interactive in order to ensure system stability. A system is stable if one CCR per product flow (route) is active at any point in time.

The question arises now whether this is desirable? If the factory has a choice, where would it like the bottleneck to be? Or perhaps the question should be expanded. Where does the top management responsible for the business - procurement, production and sales - desires the bottleneck to be?

A Decisive Competitive Edge.

Dr. Goldratt defined the concept of a Decisive Competitive Edge (DCE) in his Strategy and Tactics trees (Harmony viewer on www.goldrattresearchlabs.com) as follows:

The way to have a decisive competitive edge is to satisfy a client's significant need to the extent that no other significant competitor can.

A DCE is always necessary for a company to realize dramatic growth, such as growing sales to levels that change the top line to the bottom line. Of course this jump in performance is not possible for all companies, but to achieve truly significant growth, a DCE is absolutely essential.

Effective DCE's are in many cases attained with very high availability of product in for example fast moving consumer goods industries; or with very high reliability in meeting due dates, when product is made to order and when projects are conducted. This performance causes more customers to want to buy and enables manufacturers to choose who they want to sell to because there are now more customers who want to buy than could be supplied.

It is under these conditions that the market demand must be managed as the system's bottleneck. If not, the CCR will be overloaded, becoming an internal bottleneck again, operational performance will decay, service levels of high availability or reliability will reduce and the DCE will be lost causing less demand, less sales and stunting growth.

Applying the TOC focusing process with market demand as the chosen bottleneck

This bottleneck needs to be defined more precisely.

The market bottleneck is that market demand (volume) that the business chooses to satisfy well.

But somewhere upstream in the flow, the CCR(s) has finite capacity implying that not all demand (the whole market) can be serviced well. Management must therefore decide who are the clients that they

want to service well. And then maintain the market bottleneck resulting in sustaining the ability for high performance on availability and reliability, recognizing the finite capacity.

The 5 focusing steps can now be applied to the market bottleneck.

1. Identify the system's constraint.

The bottleneck is, in this case, the result of management deciding on the size of the market bottleneck. A useful guideline is that it should be sized as 80% of the maximum volume that the active CCR is capable of during a time period ensuring that the CCR can always subordinate to the market bottleneck.

2. Decide how to exploit the system's constraint.

Management then needs to decide which current clients they want to serve exceptionally well, and by implication who will not be served well. One way of doing this is to generate a list of all clients and rank them based on criteria such as Throughput, Throughput percentage, Throughput per operating hours of the CCR(s) and growth potential. The expected volume to be supplied to the clients are determined and accumulated from the highest ranked until 80% of the maximum volume that the CCR(s) is capable of is reached. This is the cutoff. The clients further down the list will be served whenever it is possible, but no service promises can be made to them. They are the competitors' clients.

Protection of the primary demand against fluctuations in demand and supply must also be determined in this step. Over and above the 20% protective capacity on the CCR(s), time and inventory buffers are also needed and have to be decided upon as part of this step. This includes the type and the positioning of the appropriate buffers as well as sizing the buffers. The demand from non-primary clients could be viewed as a market buffer that will be used when the CCR(s) are loaded less than 80% with primary demand and will not be used when the load is more than 80%

3. Subordinate everything else to the above decisions.

The choice has been made between primary clients who must be served exceptionally well and those that cannot be. Subordinating to this decision is typically very difficult. It requires that local efficiencies, such

as maximizing individual sales commissions, be prevented. A mechanism that would enable sales people to say no to demand from non-primary clients is necessary as a crucial part of subordination. No capacity must be used to supply non-primary demand if it might cause the inability to satisfy primary demand to its full extent. Load on the CCR from primary demand must be known daily and then a mechanism such as a different higher price list, quoting much longer lead-times, etc., could be employed to cause clients to say no.

Subordination also means that all primary demand must be serviced, even if it means that protective capacity on the CCR(s) (such as overtime) is used. The exploiting decisions that defined the primary demand should be seen as part of planning. Execution decisions that enact subordination have to be made on a day-to-day basis to fill all orders from primary demand. Expediting in response to a red buffer status needs to be in place as part of the normal subordination disciplines.

In this way planning and execution are done to sustain the very high service levels required for a DCE. If this were done well, then inevitably more and more clients want to buy and primary demand could be increased, requiring elevation of the system's constraint. Elevation has to be done in such a way that additional primary demand remains the system's constraint.

4. Elevate the system's constraint

To capitalize on this increased demand, capacity must now be expanded. The CCR(s) represents the capacity of the business and this is where expansion should be focused. The expansion should result in enough additional reliable capacity so that the market bottleneck can be widened by adding more volume to prime clients or adding new prime clients, to a new level of 80% of the volume the CCR(s) are capable of.

It can be relatively easily achieved in many cases by adding additional shifts where required. It will of course increase Operating Expenses and therefore this action should be judged by comparing the change in Operating Expenses with the change in Throughput. In order to make more money, the change in Net

Profit for the business must be positive. Additional shifts are of course not possible if the CCR(s) are already operating 24/7. Investments would then be needed to increase capacity at the CCR(s) as well as at some other resource that could become CCR(s).

To summarize, a new larger market bottleneck can be attained through a combination of increased Operating Expenses and Investment and then filled by accepting more primary clients.

5. When in any of the previous steps the constraint is broken, go back to step 1. Warning, do not allow inertia to become a system's constraint.

In this last step the warning needs to be heeded. In this case it means that care needs to be taken that nothing else but the primary demand becomes the bottleneck. Different CCR(s) could exist after capacity has been increased, but an internal system's constraint must be avoided.

Case study

A clay brick manufacturing company (CBMC) identified a segment of the market for bricks as their primary demand. CBMC competes with a large number of other suppliers to supply a major metropolitan area in a developing country with stock bricks. The metropolis has a population of about 12 million. A building boom has been experienced for a number of years and it is expected that demand will stay high for the foreseeable future.

CBMC decided to focus on that segment of clients who must have bricks the next day. They marketed "guaranteed next day delivery" well and contractors knew that CBMC is exceptionally reliable to deliver bricks the day after an order has been placed. CBMC are about 40% more expensive than the other competing suppliers.

Although the brick making machine is the CCR, the number of bricks of the four different grades is unknown until the kilns (the "oven") has been sorted at the end of the 6 week production process. The variability in the process includes breakages at each step; over and under fired bricks determining the

grade; slow drying caused by rain; faster and slower burn rate of kilns depending on wind speed and direction; production rate of the brick making machine, etc.

The number of bricks available every day is carefully counted and communicated to the sales force as available for the next day. CBMC has established such a reputation in the market that sales people are mostly order takers. In the sales office a large electronic board displays the number of bricks available today for each of the 4 grades. As orders are accepted, the number of bricks available is counted down. When zero bricks are available on a particular day, the sales force politely refuses an order and ask the client to call again the next day. The effect is that a client whose order was not accepted on any given day is typically the first to call the next day and a sale is typically not lost.

A disciplined adherence to the necessary rules for maintaining their market bottleneck enabled significantly higher selling prices, a much-improved top line and a dramatically improved bottom line.

Conclusion

This article illustrates how the 5 focusing steps of the Theory of Constraints could be applied to primary market demand as the bottleneck of the flow system. This application complies fully with the 4 flow concepts that Dr. Goldratt defined in 2008.

The application of these concepts to a number of different environments will be the topic for future articles.

References

1. Goldratt E.M., The Goal. North River Press. 1984
2. Goldratt E.M., The Haystack Syndrome. North River Press. 1990.
3. Goldratt. E.M., Standing on the Shoulder of Giants. Goldratt Group 2008.