



Theory of Constraints (TOC)

“The Theory of Constraints thinking process is a minimalist approach: it helps you to solve the problem with the least investment in time and resources that will do the job effectively. By working down to the core problem, which is really the system’s constraint, you identify the one thing to change that will do the most good - that will achieve the most “bang for your buck””.

- H. William Detmer, Professor at the University of Southern California

INTRODUCTION

Why are American companies losing market share to the foreign manufacturers? What is causing Americans to buy foreign products as opposed to the ones manufactured in the United States? The current business environment is extremely dynamic due to the forces of globalisation, fierce competition and the increasing emphasis on core competencies. In the past 25 years, American companies have adopted methods for running their business with little regard for the continuously changing success factors. Therefore, the United States has seen its dominance challenged by countries all over the world, namely Japan and Germany. More and more American companies are realizing that since the underlying business assumptions are changing, the management philosophy must change as well. The failure to recognize and understand this dynamic situation will ultimately lead to failure in the marketplace.

In response to these changes, Eliyahu Goldratt has developed a concept called *The Theory of Constraints (TOC)* that has been spreading throughout Corporate America since the mid-1980s. Mr. Goldratt is best known for his manufacturing novel called The Goal, which is based on his finite production scheduling system called Optimised Production Technology (OPT). TOC is a management philosophy that views an organization as a complex system of components that interact with each other. The objective of the firm is to improve system performance, the ability to make money for its owners, by looking at the *entire* system as opposed to a group of non-interacting components.



WHAT IS THE THEORY OF CONSTRAINTS?

The Theory of Constraints can be defined as followed:

- The Theory of Constraints is based on the idea that a company is similar to a series of links that form a chain. However, the chain is only as strong as its weakest link. This analogy parallels a company's operations and the weakest link, or constraint, is the bottleneck that impedes the company's Throughput. Therefore, the company must work to convert and strengthen the weakest link until it exceeds the current demands of the market. At this point, the next weakest link becomes the constraining factor and management should work to strengthen this constraint since it is now the limiting factor in the overall performance of the system.
- The Theory of Constraints provides a consistent framework for analysing problems. The focus of TOC is on the output of the entire system rather than breaking down the system into components. This is because these small entities have very little or no impact on the performance of the entire system. This approach will allow managers to identify system constraints and concentrate on the critical success factors of their business, whether internal (e.g. a machine, person or policy) or external (e.g. market dynamics). This concept utilizes a systematic method of building a logical chart of the problem, finding the root causes and developing steps to remove these roots.
- Emphasizes the importance of Throughput, the rate at which the system generates money through sales. Goldratt believes there is a direct link between increases in Throughput and decreases in inventory and operating expenses.
- A continuous improvement management philosophy that assumes that various constraints prevent companies from achieving high performance.
- An opponent to the traditional role of management accounting. Variance reports create a stimulus to keep everyone utilized, which creates excessive inventory and conflicts with Just-In-Time concepts.



A NEW PERSPECTIVE FOR MANAGEMENT

The Theory of Constraints represents a different approach in the management of organizations. The corporate focus in the past two decades has been shifting from the traditional minimization of costs to the overall success of the company. This new perspective towards management encourages managers to think and measure progress in terms of *Throughput* as opposed to minimizing every cost pool encountered. Companies typically focus on operating expenses, followed by Throughput and then inventory. However, Mr. Goldratt believes that the greatest gains can be realized by focusing on Throughput and then the expenses and inventory areas will follow. Therefore, the emphasis should be focused on constraints, protective capacity and buffer management in order to increase the company's ability to make money for its owners.

WHAT IS A CONSTRAINT?

This theory is predicated on the fact that complex systems are limited by only one constraint. A constraint can be any factor that prevents the company/system from generating more profit. In Goldratt's definition, there are two types of constraints that companies may encounter: physical and non-physical. A physical constraint could consist of machine capacities, the width of a hallway or the capacity of a vehicle. Non-physical constraints include policies, procedures, organizational structure, or consumer demand.

For example, the production of pharmaceuticals is constrained by the operation with the longest processing time. Mr. Goldratt believes that companies should focus attention on the company's constraining operations to enhance net profit, return on investment and cash flow. In general, the physical constraints are much easier to define and strengthen compared to the non-physical.

ASSUMPTIONS FOR THE THEORY OF CONSTRAINTS

Listed below are the underlying assumptions that were used to develop The Theory of Constraints.

1. The goal of a company is to make money now and in the future.
2. Throughput (revenue - variable cost of materials and energy) is used as a way to measure money. Direct labour is not a variable cost - it is a commitment made to the workers for the planning horizon.
3. In the short run, overhead costs are constant.



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4. There is always, at minimum, one constraint on each product that inhibits the company ability to increase revenue. This constraint could be a production capacity, logistical, or material availability limitation.
 5. There are three types of resources: scarce bottleneck resources, non-bottleneck resources and capacity constraint resources.
 6. Dependent events exist that result in interactions between resources and products. Within every manufacturing environment statistical fluctuations and random events occur.
 7. The optimised production technology system is implicitly stable - at any given time bottlenecks are identified, and the order mix is stable with respect to given resources.

HOW TO APPLY THE THEORY OF CONSTRAINTS - THE FOCUSING PROCESS

The purpose of these steps is to help focus management's attention on the constraining resources - the critical success factors that are not allowing the company to operate at its optima.

1. Identify the constraint - Determine what limits the system's performance. This could be anything from machines, policies, corporate culture or procedures.
2. Decide how to exploit the constraint - Eliminate inefficiency by determining the optimal method to increase the "capacity" of the constraint. In other words, devise the best plan to squeeze the most out of the current constraint.
3. Subordinate all other operations to the constraint - Make this initiative, to eliminate the bottleneck, a top priority. Do not let non-constraint resources continue to do work that will not further the company's ability to meet the goal - to make money for the owners.
4. Elevate the constraint to increase the Throughput - Strengthen this weak link until it exceeds the level of demand. This could include off-loading some demand, expanding a machines capability or changing a procedure. It is vital that all of the functional areas are aware of this link so another constraint is not created as another constraint is being strengthened.



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- Continuously improve the system through the avoidance of managerial inertia. Return to step 1 if the constraint still exists after step 4. If not, go back to step 1 and find the next weakest link.

BENEFITS OF THE THEORY OF CONSTRAINTS

The list below provides a summary of the high level impact of TOC on organisations.

- Expansion into TQM and Policy Management - TOC has evolved into a philosophy that has been extended throughout the organization in different facets. For example, TOC provides a framework for TQM initiatives by prioritising quality improvements in the company. In addition, TOC can assist in the identification of constraining management policies and determine where resources should be deployed to have the most impact on the overall performance of the company.
- Ability to change with the markets - Regardless of how the business environment changes, TOC will continue to be a tremendous tool for any business. Although priorities and success factors may change, companies can utilize TOC as an effective framework for identifying, prioritising and solving issues that constrain a company's profitability.

CONCLUSION

For America to regain their sole dominance in the manufacturing industry, companies must understand why and how their businesses are being managed. Current management styles have been moulded from a previous business environment and this reactive thinking is making it difficult to catch the foreign companies. Corporate America needs to adapt to this new global environment and commit to changing with the marketplace as well as continuously improving the processes. The Theory of Constraints provides an effective, systematic approach for identifying constraints to the overall business and developing a plan to alleviate these constraints.



“...By 1988, the rapidly evolving understanding exposed that the main constraints in organizations were not physical constraints (capacity, market, vendors) but policy constraints. The last development almost pushed aside the issue of synchronization and thrust the need for processes to identify and elevate these devastating, constraining policies onto centre stage.”

- Eliyahu Goldratt, author of The Goal

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