

What is Theory of Constraints?

by **Satyashri Mohanty**



While there is an ongoing debate on whether managing an organization is an art or science, developed by Dr Eli Goldratt, Theory of Constraints (TOC) assumes that it is possible to apply the principles underlying the development of hard sciences, like physics, in the area of management of organizations. Or in other words, managing an organization is a science.

The two principles which have led to the development of hard sciences are the principle of inherent convergence and the principle of inherent harmony. No scientist can ever prove the veracity of these principles. They only strongly believe in them because it has not been proved wrong yet. The beliefs have fuelled the growth of the hard sciences in the last few centuries.

Principle of Convergence (The inherent Simplicity)

Hard science (like physics or chemistry) believes in the principle of convergence. Why? If we have everything in nature connected to everything else, then an effect can never be in isolation. It has to have a cause. Physicists assume, at a fundamental level, there is a convergence of know-how which explains all other application knowledge. The history of the development of fundamental physics (and application physics) is motivated by this quest for finding the unified theory which can explain all the forces and particles in the universe. This unrelenting quest for unification over the years has led to many inventions and discoveries along the way. For example, the electro-magnetic theory helped converge the electrical field theory with the magnetic field theory and we got inventions like the Television, X Ray etc.

Similarly in organizations, there are interactions between various departments. An effect (positive or negative) in one department is because of an action in same or another department. (For example dispatches going down because finance department has decided to put a cap on overtime or breakdown time going up because maintenance department has cut the spares inventory to meet their cost reduction targets). Due to the complex relationships between entities, an action or a decision (a cause) also leads to multiple effects cross time periods and departments. Hence problems in organizations cannot be seen in isolation unless we want to just deal with symptoms. We should solve the root cause. We all know that. What is the difference? The approach of TOC towards finding the root cause is the search for convergence. As we try and dive deeper to look at causality behind the effects, and think cause-effect-cause then we will see convergence (few causes) rather than divergence (many causes). With such rigorous logical analysis we should arrive at a single core problem for an organizational system (a system of interacting departments with one common goal of making more money), which can be solved to get the next level of improvement. This shows that, at any point of time, we need to just focus on one initiative on the leverage point (or the core problem) to get the next level of improvement. Since the core problem or the leverage point is connected to many issues across departments, any improvement will give rise to a quantum jump in performance of the organization.

Principle of Harmony (Inherent Win-Win)

Hard sciences believe that nature is inherently harmonious which means contradictions do not exist. So when two physicists differ on a hypothesis, they analyse the inherent assumptions and try to invalidate them to reconcile the contradiction.

Organizations are full of chronic conflicts between departments and key managers. Conflicts manifest as heated inter-personal acrimonious debates in various meetings. While seen in isolation, each action or decision of a department looks good for that department point of view but the same action creates a conflict with objectives of the other department. While the objectives are good and widely accepted, it is the actions which create the conflict. *(For example too much focus on improving machine efficiencies everywhere with aim of reducing costs can lead to too much WIP in the shopfloor and increase in production lead time, which in turn can affect the sales opportunities)*. These conflicts can be treated like the way physicists treat contradictions. It is possible to remove the conflict by analysing the inherent assumptions behind the actions. In all situations, there is always an assumption which is erroneous (or can be invalidated), as organizations can be made inherently harmonious like the nature around us. *(For example improving machine efficiencies everywhere does not reduce costs because the assumption "resource standing idle is a waste" is invalid for non-bottleneck machines)*.

However simple the above principles may look like, they are difficult to apply when we are dealing with human based systems like an organization. There are mental obstacles to applying these two principles.

The Obstacles and Additional beliefs

The mental obstacle to applying the principle of harmony is the tendency to blame people. This tendency to blame people in organization comes in the way of objective evaluation of the erroneous assumptions underlying the conflict. At times when we are in a conflict, we tend to believe that the reason for the conflict is the other person himself.

The TOC Paradigms

- No matter how complex a system looks, it is actually inherently simple
- Every Conflict can be removed
- People are inherently good
- In every situation, substantial improvement is possible

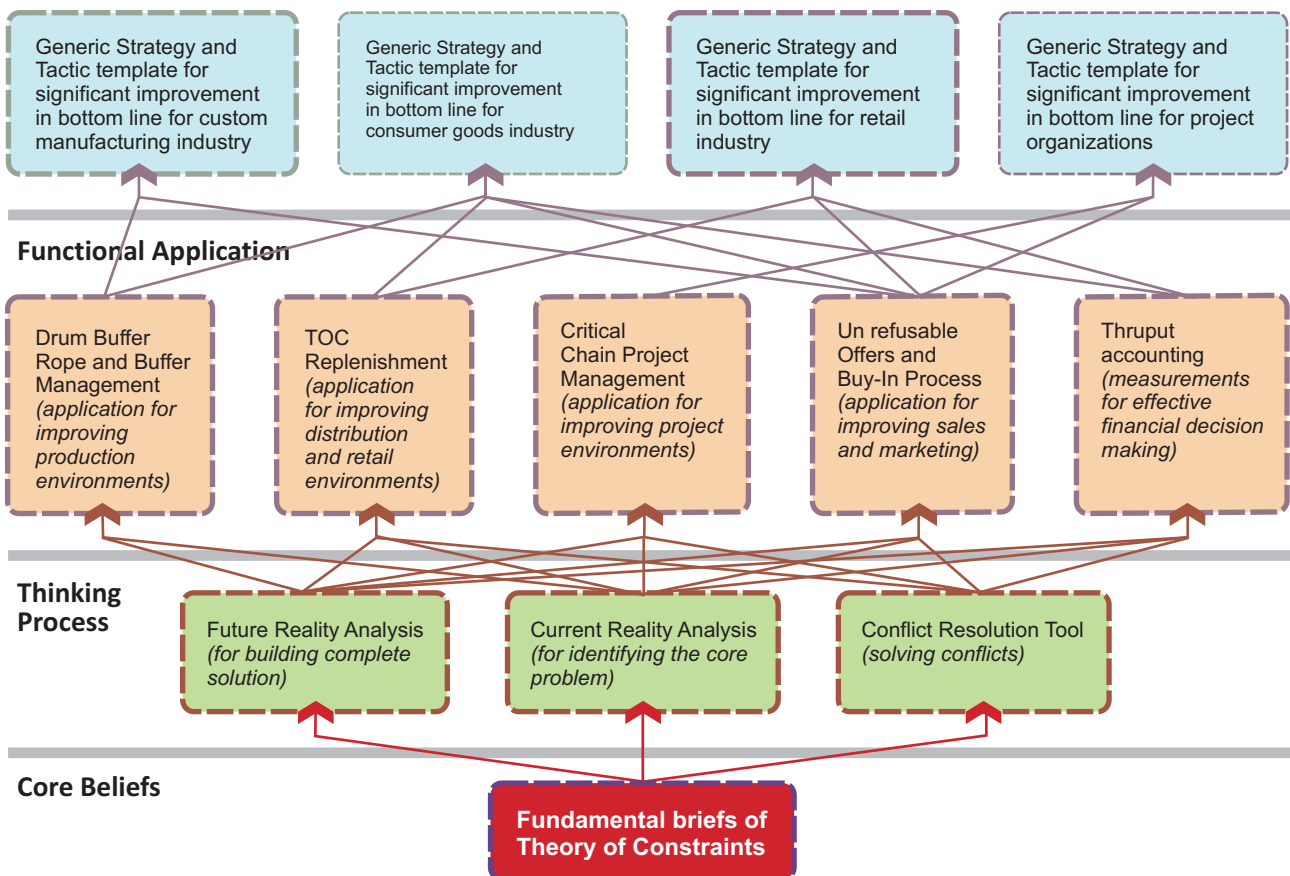
With this thinking, there is no way to go forward because other person also reciprocates with similar perception. The conflict stays on as there is no way we can reach a situation where both involved parties will objectively look for an assumption which can be invalidated.

So the only way we can apply the principle of harmony is when we also accept the principle that human beings in an organization are inherently good. This principle is the third principle of Theory of Constraints.

Similarly there is an obstacle to applying the principle of inherent simplicity. The principle of inherent simplicity shows that every organization has a leverage point which can give a quantum jump in improvement, vis-à-vis its goal, but we should be very rigorous in our analysis. The belief of stagnation or a belief that we can only have minor benefits comes in the way of applying the principle. Minor benefits come only when dealing with minor issues and not the core issue. Most cost reduction initiatives across departments come from this belief of stagnation. Many times such cost reduction initiatives provide only temporary benefits and costs go back to original level within no time. When we deal with core problem, we end up not only reducing costs on a sustainable basis but also exploit the loss sales opportunities. Usually getting additional sales from the same operating expense has more dramatic effect on profits than multiple cost reduction initiatives.

As Eli Goldratt says *"Science isn't a matter of believing only what you see. Science is a matter of believing and seeing by believing. If you believe only what you see, you won't see very much..."*

Industry specific organization wide application



The **fourth principle** is the **principle of infinite potential** or in other words a belief that in every situation substantial improvement is possible. The fourth principle helps in overcoming the mental obstacle towards the application of the principle of inherent simplicity.

Application of the Principles

Logical thinking process tools were invented by Eli to apply the above core principles to analyze organizations in a holistic manner, solve the chronic conflicts and develop robust solution.

We have already learnt that at any point of time an organization can have one constraining area which limits the ability of the organization to make more money. The constraining area can be in manufacturing (not able to deliver despite having a good backlog) or distribution (not able to make right product available at right place) or new product development (a faster pace of development will increase rate of sales) or the market (sales is stagnant and price reduction appears as the only way to increase sales).

Drum Buffer Rope: developed to exploit the manufacturing resource constraint. The application of drum-buffer-rope and buffer management helps manufacturing organizations release hidden capacity while improving reliability of deliveries with lead time reduction.

TOC Replenishment: develop for organization in the distribution and retail business. This application helps making right product available at right time and place with much lower inventory. TOC replenishment helps plug the loss sales due to unavailability.

Critical Chain Project Management: helps project organization realise benefits of the project early by significant lead time reduction. For multi-project environment, it helps release capacity to execute more projects.

Unrefusable Offers: This application helps organizations develop a compelling offer for its clients to increase the sales without reducing prices.

Throughput Accounting: Thruput accounting was developed to improve effectiveness of financial decision making. Most business decisions made using cost accounting rules can be erroneous and can lead to cost or revenue leakages.

Over last 5 years, the functional area solutions have been combined to develop an organization wide generic strategy and tactic templates for getting a significant jump in profits in various industries like consumer goods, retail, custom manufacturing and project organizations.

The Success Stories

TOC has been implemented successfully with spectacular success in hundreds of companies worldwide and in India. Typical benefits achieved in a few months to a year of implementing TOC include revenue/throughput up 63%, due date performance up 44%, inventory levels down 49%, lead times down 70% (all data from "The World of Theory of Constraints " by V. Mabin and S. Balderstone , 2000, mean of published results excluding outliers eg. 600% improvement by Lucent).

The Author is a founding Director of Vector Consulting Group – India's largest and premier Theory of constraints based consulting company that engages with leading corporate to deliver bottom line results and takes its fee from the increase of profit thus delivered.