

# **Illuminate**

## **The theory of constraints in services: part 1 – the basics**

*Jaideep Motwani  
Donald Klein and  
Raanan Harowitz*

### **The authors**

Jaideep Motwani and Donald Klein are at the Seidman School of Business, Grand Valley State University, Grand Rapids, Michigan, USA.

Raanan Harowitz is with Elbit Systems, Inc., Dallas, Texas, USA.

### **Abstract**

Several authors have investigated and proposed implementation for the theory of constraints philosophy in manufacturing organizations. However, no study has addressed the application of TOC (the theory of constraints) in service organizations. In this two-part article illustrates how TOC can be applied to service and not-for-profit organizations. Part 1 explains the basic principles of TOC.

A variety of modern management philosophies and techniques has been applied in the last decade to manufacturing organizations, with the purpose of improving performance in an increasingly competitive environment. Although most of the industrial management techniques seem to be tailored towards the manufacturing firm, they are now being applied to new areas in service industries. These industries are facing the same kind of competitive pressures felt throughout the years by industrial organizations.

This article suggests that it is possible and beneficial to apply modern management techniques to service industries and to generate ongoing improvement. The theory of constraints (TOC), TQM (total quality management) philosophy and JIT (just-in-time) can be used effectively to assist managers of service organizations in identifying their organization goals, the constraints to improved performance, and the most effective solutions. The TOC can also be applied to not-for-profit organizations to improve performance towards non-financial goals and to assure financial survival. By applying this to a Red Cross relief operations example, it is shown that even specific shop-control techniques such as the DBR (drum-buffer-rope) method can be used to improve throughput of for-profit and not-for-profit service organizations.

### **The basic philosophy of the TOC**

The TOC is an intuitive framework, developed by Goldratt[1], for managing organizations. Implicit in the TOC framework is the desire to improve performance of organizations continually, through a process of ongoing improvement. The TOC emphasizes the importance of defining and understanding the global goal of the organization as a condition for success. This concept is based on the assumption that resources available for managers and organizations are limited, and should therefore be directed towards a well-defined and focused goal. According to the TOC, the goal of a corporation should not be defined using terms such as technology, share of market, automation, quality or human resource development, but as the ability to generate profits in the present and in the future[2].

Ownership has the right to establish goals. Stockholders of publicly held companies invest for maximum returns on their investments. In a private or non-profit organization

the goal may be other than maximizing profits. When applying the TOC to a manufacturing organization, for example, Gardener and Blackstone[3] defined the primary goal of such an organization as the maximization of long-run profit. In order to maximize the efficiency of resources used in the organization, the TOC requires that after clearly defining the goal, the organization establish specific measurements that will enable management to determine the impact of any action on the goal.

In order to understand better the unique approach of the TOC, it is important to examine its relationship to other powerful techniques such as JIT and TQM. The JIT and TQM philosophies are emphasizing customers, management commitment, lead time, statistical process control (SPC), market share, eliminating waste, simplification and throughput, among other factors, as the key to achieving continuous improvement. They suggest a variety of excellent techniques designed to support the improvement process. However, both philosophies are solidly rooted in the concept that any improvement, anywhere in the process, improves the performance of the whole organization.

The TOC, on the other hand, uses a different point of view which is described clearly by Umble and Spoede[4], using the analogy of a steel chain. In order to strengthen the chain, one must strengthen the weakest link. If a link other than the weakest is strengthened, the strength of the whole chain is not increased. The concept of a chain can be used to represent processes in any organization. Using multiple dimensions, complete organizations can be modelled as process grids made of sets of interlaced chains. To achieve the organization's goal, every link – resource, or functional area – must perform its job effectively.

According to the TOC, improvements in the organization should focus on the weakest link in the chain. Only actions that eventually improve the bottom line are considered improvements. The theory considers other actions an inferior use of precious resources, which otherwise may have been used to improve the weakest areas and progress towards the goal. The strength of the TOC lays in the fact that, contrary to most other management techniques, it provides a method for focusing all local efforts on improving the appropriate links, and achieving quicker bottom line improvements. The result is a

significantly faster rate of improvement in the performance of the complete chain.

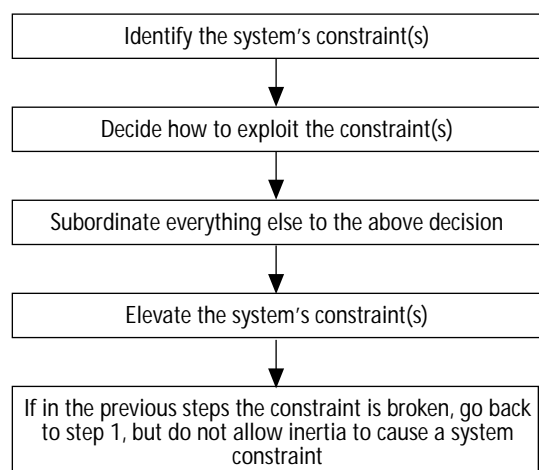
The framework of the TOC rests on the fact that an organization must always have constraints that limit the organization from achieving higher performance in terms of its goal. Constraints must exist, or else performance would be unlimited. The TOC identifies the weakest links within the organization as constraints. As defined by Umble and Spoede[4], "TOC is an overall management philosophy which emphasizes constraints identification and management as the keys to focusing limited time and resources on areas where potential returns are greatest."

### Ongoing improvement using the TOC

The basic technique used by the TOC to focus improvement in organizations comprises five basic steps, described in Figure 1[1,5]. It follows that if our mission is to improve our organizational chain, then:

- (1) identify the weakest link (system's constraint);
- (2) decide how to exploit the constraint (how to get the most out of the constraint, relative to what the system is trying to achieve);
- (3) subordinate all other links to the above decision (make sure the rest of the system is enabled to help, not detract from, its ability to achieve step 2);
- (4) elevate the system's constraint (acquire more resources);
- (5) if a constraint has been "broken" in the above steps, go back to step 1. (However, beware of the inertia monster – do not let it become your system's constraint.)

Figure 1 Five steps to achieving ongoing improvement



Source: [1,5]

There are two types of constraints – physical and policy. Goldratt[1] states that 99 per cent of an organization's constraints are policies or lack of them. When one deals with a policy constraint only steps 1, 4 and 5 of the basic steps are utilized. These steps provide a framework for management decision making that focuses on the goal of the organization. The technique emphasizes the need for change as a condition for improvement. The focusing steps are aimed at identifying areas in the organization that require change. This is another important facet of the TOC philosophy. According to the TOC, the lack of clear organization goals to be followed by each functional area of the organization results in pursuit of local or, worse, personal objectives which are virtually independent of the larger objectives of the company.

These local objectives often conflict with larger, global objectives, and improvement is slowed. In order to facilitate ongoing improvements it is important to assure adherence of the entire organization to the ultimate global goals. Change in an organization can be achieved to a significant extent only if management clearly and fully realizes what needs to be changed and why.

As numerous researchers have shown, the process of organizational change is one of the most difficult to achieve. In order to synchronize the initiation, creation and response to these essential changes the TOC proposes the following Socratic thinking process for dealing with change[2]:

- What to change? – assessment of what are the constraints to improved performance. Applying the TOC to the “What to change” question often leads to the identification of an organizational constraint.
- What to change to? – devising simple, practical changes to the core problem/constraint identified. The TOC emphasizes that only simple solutions have a real chance of working in a real organization.
- How to create change? – developing strategies and actions to break undesired constraints and manage constraints in desired areas.

An important aspect of this phase is to create ownership and commitment throughout the organization.

In order to determine the impact of actions on the organization, Goldratt and Fox's TOC[5], identifies three basic measurements. These measurements should be adopted at each

organizational level to guide decisions relating to the management of an operation:

- *Throughput*. The rate at which the system produces outputs which are conforming to the organization's goal. For a typical manufacturing organization, this would be the rate at which the company generates money through sales of products.
- *Inventory*. The amount of assets involved in the process. Again, for the typical manufacturing organization this would be all the money the company invested in purchasing things that it intends to process and sell.
- *Operating expenses*. All the money that the company spends in the process of turning inventory into throughput.

One major difference between the TOC approach to managing an industrial organization and the conventional approaches, is in the relative priority given to these three measurements. While most managers consider all three measurements important, the conventional approaches tend to regard operating expenses (cost) as the most important. The TOC sets different priorities and believes that throughput should be at the top of the list, inventory next and operating expense last. To improve, an organization should first make an effort to increase throughput, then decrease inventory and decrease operating expenses. Whenever possible, the first line of action should be to improve throughput.

### A TOC approach to service organizations

Several authors[2,6-8] investigated and proposed implementations for the TOC philosophy in organizations which manufacture products. The theory has already been implemented successfully in several manufacturing organizations and some techniques such as the Drum-Buffer-Rope method have been developed to support implementation of scheduling and decision making on the shopfloor[9]. Results show significant improvements in throughput, on-time shipments, inventory turns and other important factors which have direct influence on companies' bottom lines. A question arises whether the TOC is applicable only to manufacturing organizations or whether it encompasses service-type organizations as well. Other modern management philosophies such as TQM have been found very applicable and have been successfully implemented already in service organizations. Can service organiza-

tions benefit from implementation of the TOC?

First, let us consider the basic surmise of the theory which is the existence of organizational constraints. Coming from the manufacturing viewpoint, we tend to identify constraints as physical – not enough machining capacity, limited floor-space, lack of materials and other things. In fact, experience shows that most constraints in organizations are policy or procedural constraints rather than physical. In many cases, what limits or sometimes even diminishes the performance of an organization is actually the organization's management policies and operation procedures. As a simple example, capacity can be limited by an operational directive forbidding overtime. Service may be hindered as a result of the immediate service provider not being authorized to approve or perform certain necessary actions. We therefore frequently find that the biggest and most immediate gains in performance may be achieved by thoroughly identifying and changing harmful constraints in the organization. By providing a systematic questioning method to reveal and clearly describe problematic areas that supposedly are implicitly known to all, the TOC can be usefully applied not only to manufacturing industry but also to the service industry.

Our intent is not to underestimate the importance of operating procedures and policies to organizations. They are crucial in service and manufacturing organizations to guide actions and behaviour, and to provide solutions to specific problems. However, they seldom are modified when the external environment changes. Some are so rooted in the organization that they are difficult to attack. The Socratic thinking process proposed by the TOC handles the inherent resentment to change by using a sequence of questions leading to self-revelation and creating a sense of ownership.

Next, let us examine the notion of ongoing improvements. The TOC holds that only improving the weakest link in the chain will create the desired effect on the organization's bottom line. To measure the effect of actions, we must first concentrate on defining the organization's goal. In manufacturing, we already identified the ultimate goal as making profit. How would we measure goals in service type organizations? For most of the service industry, we can continue to define

profit as the organization's goal. Dealing with daily measurements, however, becomes a more difficult issue. Throughput, for example, is ordinarily considered to be a manufacturing term that has to do with the flow of products along a production line. Service organizations do not manufacture products. They do not carry limited capacity machinery. Some not-for-profit organizations are not even interested in making money. In order to apply the TOC therefore, we need to re-evaluate and define the basic measurements needed to guide decisions and provide essential feedback on improvement.

We begin by trying to present a basic service organization as a system. A system is basically a process, or a series of processes, in which inputs are turned into desired outputs. The TOC defines two basic inputs as inventory and operating expenses, and the output as throughput. It may be easier to analyse the application for a specific example – and part 2 of this article will do that in the next issue of *Managing Service Quality* when, having explained the principles and their basic application, we look for examples from the world of health care provision.

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