

## Chapter 9

# The Theory of Constraints: A Management Philosophy

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### ABSTRACT

*In the late 1970s, a new approach to the management of operations was developed by Goldratt. Now known as the theory of constraints (TOC), it provides a coherent management theory for running an organisation. It has two major components: a philosophy which underpins the working principle of on-going improvement and a generic approach for investigating, analyzing, and creating solutions to problems, called the “thinking process” (TP). Several books, numerous articles, and a few journal special issues have been published on TOC. This chapter provides a comprehensive review of TOC concepts, philosophy, and working principles.*

### INTRODUCTION

Businesses are competing increasingly on responsiveness and service. Companies cannot survive if they fail to obtain competitive advantages by providing a high level of service and distributing in shorter delivery times with quicker inventory turnover. Since the early 1970s, three important approaches have evolved for companies to achieve competitive advantages, each challenges old as-

sumptions and ways of doing things. These are just-in-time (JIT) (Moden, 1993), or lean manufacturing (Womack and Jones, 1996), total quality management (TQM) (Deming, 1986) and theory of constraints (TOC) (Goldratt, 1988).

Developed by Eli Goldratt in the mid-1980s (Goldratt, 1988) TOC evolved from the Optimized Production Timetables (OPT) system (Goldratt, 1980), later known by the commercial name of Optimized Production Technology (OPT®). As a marketing tool for the OPT system, Goldratt illustrated OPT concepts in a novel (Goldratt

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and Cox, 1984) in which the theory is gradually unravelled through the context of an everyday production situation. The concepts identified in this book (*The Goal*) were more fully developed as results from actual OPT implementation became known. A second book, *The Race* (Goldratt and Fox, 1986), was written to illustrate overcoming difficulties encountered in implementation. It introduced a logistical system for material flow, called drum-buffer-rope (DBR), and gradually, the focus of OPT has moved from the production floor to encompass all aspects of business. By 1987, the overall concept became known as the theory of constraints (TOC), which Goldratt viewed as “an overall theory for running an organisation” (Goldratt, 1988, p.453). This refinement to OPT recognised that the main constraint in most organisations may not be physical but rather managerial and policy related. To address the policy constraints and effectively implement the process of ongoing improvement, Goldratt (1990, 1994) developed a generic approach, ‘Thinking Process’ (TP).

In the following section provides a review of existing literature, highlighting the areas of TOC application and its impact on organisational performance.

## **BACKGROUND**

The theory of constraints (TOC) is a system-based management philosophy which seeks to understand and identify the core causes that limit a system from achieving higher performance versus its goal (Goldratt, 1988). Although a relatively new approach, applications of TOC concepts and tools have been published widely in academic literature and the popular press. This body of literature has been written to:

- demonstrate the basic concepts of TOC;
- review TOC literature;

- review the historical development of OPT as well as TOC and TP applications;
- define and categorise concepts and terms;
- demonstrate the impact of OPT software on organisational performance;
- compare aspects of TOC with other operations management tools such as material requirement planning (MRP) and Kanban, linear programming, and total quality management;
- compare the TOC performance measures with traditional cost accounting and activity-based cost accounting management;
- develop a TOC-based framework for operations management.

Much of the earlier TOC studies focused on manufacturing companies (Rahman, 1998). The application to service organisations is relatively new. The TOC tools have been implemented across a variety of service organisations, including: livestock production; education institutions; the health sector; military health services and the banking sector. These studies used either the five-focusing steps or the TP mapping tools of TOC.

The TOC tools have been applied in conjunction with other management techniques. For example, Ehie and Sheu (2005) implemented a combined six-sigma and TOC approach in an automobile components production facility and made substantial cost-savings for the company. Recently, Lacerda et al. (2010) applied TP in conjunction with process engineering in an academic institution to redesign processes related to the delivery of various academic programs. The improvement through integration of TOC and other tools doesn’t come as a surprise. A study by Pirasteh and Farah (2006) concluded that when lean management, six sigma and TOC principles are implemented together, it is possible to realise cost savings up to nine times higher than the independent application of either lean or six sigma.

A number of Fortune 500 companies including Boeing, Ford Motor Company, General Motors,

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