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Using theory of constraints for reaching optimal product mix: An application in the furniture sector

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Abstract

With the globalization, intense competition and technological advances, the inadequacy of the traditional management and cost accounting methods that meet the needs of firms and achieve their goals has led to the development of new methods, such as theory of constraints. Theory of constraints, developed by Goldratt in 1980s, is defined as effectively managing the constraints that prevent firms from achieving their goals. In the theory of constraints, it is focused on increased restricted contribution margin, reducing inventories and operating expenses. Thus, profitability can be improved by directed enterprise resources efficiently.

The purpose of the study is to provide effectively managed constraints by defining constraints that prevent their targets and thus to increase the profitability of firms. For this purpose, theory of constraints practice was carried out in a furniture firm which operates in the Mediterranean Region. As a result, it is found that, there are capacity constraints in the firm and the profitability will increase 42% after the elimination of this constraint.

JEL classification: M41; M49

Keywords: Theory of constraints; Cost; Cost minimization.

1. Introduction

Traditional methods were not sufficient neither for cost accounting nor management accounting in the globally competing markets (Büyükyılmaz & Gürkan, 2009: 178). Such a business environment forces firms to use their resources more efficiently for reaching their main objectives which are increasing profitability and value. Firms

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should use modern management and cost accounting techniques as theory of constraints in order to reach these goals.

For 30 years, theory of constraints has been widely used by many public or private companies which operates in production, logistics, distribution, project management, R&D, marketing etc. (Ronen, 2005: 1–2). The Theory of Constraints is widely analyzed in the scientific sources in different countries. In Lithuania Čiegis and Jasinskas (2006), Jaasinavičius et al. (2006), Pukėnaitė (2006), Sarapinas and Sūdžius (2009) analysed the theory of constrains in different aspects. Firms which have used theory of constraints and the positive change in their performance indicators are summarized below (Goldratt, 2004: 2).

- Avery Dennison: At the end of 18 months of application process, 32% decrease in the waste materials, 17–25% increase in market share, 23% increase in net sales, 47% increase in customer satisfaction, 80% increase in filling order rate, 50% increase in the sales of new products.
- TBS Furniture: Filling order rate decreased from 6–8 weeks to 1 week while sales increased 80%, delivery speed increased 97%, operating costs decreased 40% and stocks decreased £2 million. And capital turnover reached to £17 million from £13 million.
- Ford Motor Company: Filling order rate decreased from 10.6 days to 2.2 days while delivery time and quality mistakes decreased 60–70% and 50% respectively. Meanwhile, customer satisfaction, investment efficiency and in time delivery increased 75%, 20% and 38% respectively.
- Motorola: Production time decreased 20% while throughput (outcome) of this process increased 150%. Production capacity extension possibility increased by using latest technology.
- Pharmacia: Order delivery time decreased more than 60% and packaging rate increased from 20% to 50%. Delivering the orders in time increased over 90%.
- Rockwell International: Costs decreased 25%, disorders in the production process decreased 31% and time spent for controlling the outcomes decreased 44%.
- Boeing: Order delivery time decreased 75%, stocks decreased 60% while throughput (outcome) increased 50%. Just in time delivery rate almost reached 100%.

The other international companies that apply theory of constraints are; ABB Corporation, AT&T, Bell Laboratories, Baxter, Delco Products, Delta Airlines, General Motors, Harris Semiconductor, Hewlett Packard Puerto Rico, Intel International, IPL, National Semiconductor, Naval Aviation Depot, Pratt &Whitney Government Engines, Procter & Gamble, Samsonite S.A., United States Air Force, United States Coast Guard (İlhan, 2014: 8).

2. Theory of constraints

At first theory of constraints was identified as managing the difficulties which prevent the reaching firms to their goals. But later, it was improved by Goldratt and that's how it could be also used in management and cost accounting (Ronen, 2005: 1–2).

According to Goldratt, activities in the firm resemble to a chain and every chain has a weak link which is defined as constraint according to the theory of constraints. Since the strength of the chain depends on the weakest link, first the weakest link should get strengthened. Strengthening the weakest link means eliminating the constraint and leaks to improvement of the whole system (Büyükyılmaz & Gürkan, 2009: 181). According to the theory, there is at least one constraint in any firms that prevents the management to reach its goals. Theory of constraints basically claims that the capacity of a firm is limited with the constraints in the production process. Therefore, it is necessary to define and eliminate the constraints in order to increase the firm capacity. According to theory of constraints eliminating a constraint leads to the occurrence of another constraint and this new constraint also should be eliminated. Hence, theory of constraints leads firms to focus on constant improvement process (Yüksel, 2011: 3624). Main assumptions of theory of constraints are summarized below (Huang, 1999: 21–27; Kaygusuz, 2006: 175):

- *Main purpose of firms is gaining profit*: If a firm thought as a chain then this chain as strong as the weakest link. From this point of view, weakest link should be found and strengthened. In the full costing method, costs are charged equally to the links and weakest link also get the same share as the strong links. So, traditional