

TITLE

DEBATING THE PRINCIPLES:
THEORY OF CONSTRAINTS

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INTRODUCTION

This article examines the principles that underlie existing management accounting approaches. Throughout 2007, a series of articles appeared in this journal that made the case for the recognition of fundamental principles in management accounting.¹ That series highlighted the need to base managers' decision support information on the inductive principles that underlie the scientific method. In particular, the focus was on: 1) the monetary information management accounting provides; and 2) causality as the guiding principle behind this information. Causality (the relation between a cause and its effects) is the principle that underlies the decision making process and therefore should serve as the basis for the accompanying monetary information managers rely on when evaluating decision alternatives.

This current series of articles has a twofold purpose: 1) to point to limitations of alternate principles that make them unsuitable for use in the decision science domain, and 2) to highlight problems and inconsistencies in approaches that employ these alternate principles. The subject of this article is the theory of constraints (TOC) and the principle it employs in generating monetary decision support information.

The last decade saw a concerted effort to establish TOC's throughput-based management accounting approach as a comprehensive management accounting alternative. This movement uses various names including throughput value added, constraints accounting, three questions accounting, and throughput accounting. TOC, however, has always blended its production scheduling approach with a corresponding financial outcome. This discussion will therefore abide by

the traditional (and more familiar) TOC designation. The variety of names used might signal a disjointed attempt to legitimize TOC in the sphere of management accounting and decision science, but proponents' claims are unambiguous. These include: "*A new paradigm in management accounting*,"² and "*A fully integrated and supporting accounting system* ℓ"³.

THE THEORY OF CONSTRAINTS

Dr. Eliyahu M. Goldratt is the father of TOC. He is a physicist and the scientific method features prominently in his solutions to business problems. This is evident in TOC's systems approach as well as its structured thinking processes (called *logic trees*), which are described as Dr. Goldratt's invention expressing the scientific method for use outside the "hard" sciences, such as in management.⁴

TOC as a production scheduling approach is known by various names, including synchronous production, synchronous flow manufacturing, and constraints management.⁵ These names highlight its systems approach and focus on the system constraint. TOC's five focusing steps explicitly target exploiting the constraint and subordinating everything in the system to the constraint. TOC has a loyal following in particular among manufacturers and is credited with, among other things, improving product mix profitability, exposing hidden capacity, reducing inventories, and improving delivery performance.

Management accounting in TOC focuses on a monetary view (throughput) for exploiting the system constraint. Decisions at the product unit level equate throughput (T) to the unit price (P) minus TOC's "*totally variable cost*" (TVC) i.e., $T = P - TVC$. "*Totally variable costs*" are defined as costs that change with change/s in



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unit/s of product. In manufacturing, TVC comprise direct material costs and outside resource or service direct costs (e.g., electricity to produce a product). All other regularly incurred expenses (those that are not "*totally variable*" such as direct and indirect labor) are accumulated in an operating expense cost pool (OE).⁶ This approach to cost modeling and the terminology TOC uses come with their own set of challenges.

TOC proponents criticize traditional practice for modeling variable costs that are not relevant (e.g., as is often the case with direct labor costs) or for assigning fixed costs to products, which TOC never considers relevant. This criticism, however, is based upon a fundamental error. In traditional practice fixed and variable are concepts reflecting operational cost behavior. For decision support, on the other hand, traditional practice uses the avoidable concept (i.e., a cost that will no longer be incurred due to a decision). This distinction between operational cost concepts and decision support cost concepts has been recognized since at least the early 1920s.⁷

There is no dichotomy in using fixed and variable in operational cost modeling and subsequently determining decision relevant costs—from that same operational baseline—to understand the avoidable costs for a decision. It is the TOC proponent that ambiguously uses "*totally variable*" to mean avoidable. This error (the blended cost concept error) has been particularly prevalent since the mid 1980s and is nowhere more aptly illustrated than in TOC's totally variable cost, which is in fact the *avoidable* costs for a throughput decision. TOC's use of the term "*variable*" to express a decision cost concept results in communication challenges with peers in the management accounting profession.⁸ The

extent of the communication problem is revealed in illustrations intended to demonstrate TOC's superior decision support over traditional practice. TOC proponents often impute their own error onto traditional practice in their analysis and incorrectly brand traditional variable costs as avoidable costs.⁹ However, if the concepts of variability and avoidability are correctly applied in such illustrations there are no differences in the outcomes traditional practice and TOC would provide.

In TOC, optimization of a business (i.e., a system) requires only the maximization of throughput (T) over the constraint. Any assignment of costs to products beyond TOC's totally variable cost is summarily dismissed as "*flawed cost accounting thinking*", i.e., there is no need in TOC to assign other costs to products for decision support.¹⁰

The simplicity of the TOC approach is considered an advantage. This—together with its management accounting capability claims—implies a simple solution that is comprehensive in its approach to optimization decision support; but are the optimization needs of the business world adequately represented by $T = P - TVC$? Below, two scenarios are presented that question this view of managers' monetary decision support needs. The first relates to TOC's ability to thoroughly engage on the decision science playing field, e.g., to adequately deal with uncertainty. TOC is about throughput; and when multiple orders are involved it strives to maximize *total* throughput. TOC receives most of its accolades when the maximization goal involves a constrained resource that governs the flow of an entire plant. However, all resources are not systemically constrained in every instance (e.g., job shops and many



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maintenance entities); and what happens when total throughput is unknown? The second scenario goes beyond throughput and explores TOC's ability to support decisions that are more incisive. A large number of decisions in business are dependent on insight into TOC's OE. These decisions, such as changing a company's cost structure by adopting a new technology, are in many cases essential for survival. How transparent is OE to supporting decisions that are more incisive in nature?

SCENARIO 1: RESOURCES ARE UNCONSTRAINED AND TOTAL THROUGHPUT IS UNKNOWN

Company XYZ makes a number of different products.¹¹ On the first day of the month, during the

daily review of new orders, the manager notices two orders that must be processed on the same machine—a large wiring harness jig. The machine has ample capacity (it is not constrained) but only one of the orders can be accepted due to the customers' requested delivery dates. The revenue, material costs, and labor resource commitments for each order appear in *Exhibit 1 (see below)*. Assume: 1) variable conversion costs comprise direct labor cost only; 2) machine time for the two products is the same; and 3) labor is fungible across products. There are no changes in OE for either order, there are no firm orders for the rest of the month, but the company has never had a month with only two orders.

EXHIBIT 1: REVENUE, MATERIAL COSTS, AND LABOR RESOURCE COMMITMENTS

Mutually Exclusive Options	Order #1	Order #2
Revenue	\$20,000	\$20,000
Material Cost	\$499	\$699
Variable Conversion Cost	\$10,000 (i.e., 1,000 hours)	\$8,000 (i.e., 800 hours)



The manager uses TOC and would accept order #1 since it maximizes throughput. For order #1 $T = P - TVC$ equals $\$20,000 - \$499 = \$19,501$, and for order #2: $\$20,000 - 699 = 19,301$. Traditional practice, on the other hand, would approach the decision (a mutually exclusive resource application decision) considering each option's contribution margin. The contribution margin is useful in that it embodies a measure of committing resources to a particular course of action, i.e., it provides an indication of the resources' opportunity cost.¹² The question the traditional approach strives to answer is: Does the opportunity forgone, by tying up 200 additional labor hours for order #1, outweigh the \$200 more in throughput the order generates? The objective is to commit the least amount

of total resources for the contribution generated, which will leave more resources free for other orders and hence a higher total profit. This is an assessment TOC cannot support because it does not model resources' variable costs, nor does it consider the opportunity cost of unconstrained resources relevant in throughput decisions.¹³

The magnitude of the problem for TOC becomes obvious if one makes the opportunity cost very difficult to ignore. Consider *Exhibit 2* (see below) where material and variable conversion costs change as shown, while all other decision parameters remain the same. Now ten times the labor resources are committed to generate one dollar more in throughput.

EXHIBIT 2: MATERIAL AND VARIABLE CONVERSION COSTS

Mutually Exclusive Options	Order #1	Order #2
Revenue	\$20,000	\$20,000
Material Cost	\$499	\$500
Variable Conversion Cost	\$10,000 (i.e., 1,000 hours)	\$1,000 (i.e., 100 hours)



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TOC will again select order #1, i.e., it will always select the option for which throughput amounts to: "A bird in the hand is better than two in the bush." This is because it does not consider resources' opportunity costs to be relevant. In TOC, the bird (throughput dollars) is the primary variable as $T = P - TVC$ clearly indicates. Notice, however, if one selects order #1, your hands (your resources) are tied up for 1,000 hours. Competitors (who select order #2), however, are free to grab as many more birds (throughput) as their free hands (efficient application of resources, i.e., 900 hours) allow them! There are clearly both birds *and* hands in play when it comes to optimization. In some throughput scenarios, therefore, TOC is vulnerable to selecting suboptimal overall outcomes because it views its totally variable costs as the only relevant costs.¹⁴

In optimization decision making there has to be a tipping point as to the number of resources to commit to a particular course of action; or will TOC burn unconstrained resources *ad infinitum* for just one more dollar of throughput, when some of those resources could earn additional money? Besides, the careless use of unconstrained resources heightens the possibility of interactive constraints—a highly undesirable state of affairs in TOC.

The future order volume and the total actual throughput that will result are unknown, but that is not license to squander resources. The opportunity cost concept is essential precisely *because* the future is unknown; it behooves managers to do the most with the least amount of total resources today because tomorrow brings its own opportunities.

This mutually exclusive resource application scenario highlights the uncertainty inherent in the future.

This, however, is the playing field of decision science: it is all about the future. Any approach that attempts to sell itself as a comprehensive management accounting solution must be prepared to deal with decision support in scenarios of uncertainty.

SCENARIO 2: HOW TRANSPARENT IS THE GLOBAL OE COST POOL?

Decisions that are more incisive in nature require the decision maker to divine relevant monetary decision support information from TOC's OE. The general ledger (G/L) serves as the initial source of OE financial data,¹⁵ which is a liability since the G/L collects financial data for its own purposes and not for decision support. G/L information is too aggregate and lacks segmentation for effective decision support. Moreover, OE lacks cost classifications as the following statement shows: "*TOC doesn't classify expenses as fixed, variable, indirect, or direct, so OE is all other costs except totally variable costs.*"¹⁶ The question therefore becomes: how transparent is OE to support more incisive decisions?

Consider the example of Great Lakes Miles, a company that operates a fleet of 100 trucks in the long-distance hauling market and serves their customers under three to four-year contracts that are highly competitively bid. Great Lakes therefore has very little wiggle room on the product and throughput ends of its business. Moreover, with total operating costs averaging ninety-three percent of revenue in the hauling business, companies survive by running tight and efficient operations. Great Lakes has accumulated a fleet of trucks that they both own and lease. They currently perform all the routine maintenance and overhauls on



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the fleet. Great Lakes' totally variable costs comprise of diesel fuel and driver wages based on mileage; its OE totals \$10 million annually.

A truck OEM (original equipment manufacturer) approaches Great Lakes with a new lease deal. The deal is structured around a bio-diesel truck that uses two turbo-chargers in series and increases fuel efficiency by eight to twelve percent. As part of the deal, the OEM will perform all overhauls but routine maintenance will remain Great Lakes' responsibility.

Management recognizes the importance of thoroughly evaluating the serial turbo charger technology, particularly in light of the recent trend in and long-term outlook on crude oil prices. They use a TOC current reality logic tree to get their arms around the decision. The objective is to find that point in fleet composition between owned, currently leased and newly leased trucks where diesel fuel cost, total maintenance cost, and lease payments are minimized. The logic tree points to a potential reduction in maintenance material costs and technician wages. Management settles on including three years of information in the analysis. The logic tree further reveals that, to support the decision, the maintenance costs must be segmented into the following categories: 1) by truck age—those with less than 400,000 miles since last overhaul and those with more; 2) by OEM—Great Lakes operates trucks from three OEMs; and 3) by type of maintenance—routine maintenance and major maintenance (twelve categories in all: $2 \times 3 \times 2 = 12$).

There is ample reference in TOC literature to consider change in OE for non-throughput decision support, e.g., *"What will be the impact of our decision on the amount of money we spend to operate the*

*company?"*¹⁷ At a more practical level this process is described as follows: *"The increases and decreases in OE are analyzed on a case by case basis, taking into account their impact on the bottom line."*¹⁸ Change in OE therefore signals relevant costs for non-throughput decisions. However, this *"will OE change"* approach to divining the costs for a decision faces a number of challenges:

1. In the process of making any particular decision, there can be no observable change in OE relevant to that decision since the decision must first be taken and implemented before any change in OE will be evident. Expected cost changes must therefore be inferred. Management faces a \$10 million OE, only some of which are potentially relevant to the decision. Given the limited classification of costs in OE, how is the decision analysis supported?
2. TOC implies that OE does not change apart from decisions,¹⁹ but Great Lakes' OE fluctuates based on a number of normal operating characteristics. For example: 1) truck recovery and repair costs increase in the winter months; and 2) major maintenance events occur at varying times during a year as a function of truck age and fleet replacement policy (i.e., new trucks acquired together will—due to similar utilization—require overhauls at roughly the same time causing a spike in OE).
3. Therefore, due to points 1 and 2 above, gleaning the effects of the technology adoption decision from OE requires some sort of structure in the information. Management faces three years of historical G/L data. How do they make the decision without first isolating potentially relevant costs and then recasting thousands of invoices and tens of thousands of line items into the twelve categories identified?
4. There is no basis in TOC to compile the information for the decision. Once total maintenance cost has been identified, it must be divided into the twelve categories *before* the TOC criterion of *"will OE change"* can be applied. This is



underscored by the fact that some of the twelve categories' costs will defy the TOC criterion, i.e., the costs of those trucks that are not replaced with newly leased trucks "will not change." TOC's "will OE change" criterion can therefore not serve as the basis for arriving at the costs for each category. The prerequisite to the "will OE change" criterion is insight into potentially relevant costs segmented appropriately for the decision at hand. This segmentation requirement falls victim to TOC's dismissal of insights into resource consumption beyond its totally variable cost, i.e., material and labor cost assignments to the twelve categories are obviously required but TOC considers that flawed cost accounting thinking.

5. Moreover, gleaning the potential effects of a decision using OE information requires insights into cause and effect relationships. For example, assume Great Lakes owns some bio-diesel trucks with serial turbo-chargers, and that the number of labor hours for routine maintenance for that category of truck is higher than normal. This causal insight and its corresponding monetary impact are important to the analysis, i.e., would the higher routine maintenance wage costs for the new trucks offset the other benefits? There are no such cause and effect relationships modeled in OE that can guide the decision making process or provide insight into the causal relationship's bottom line implications.

There is an age-old axiom in management accounting that highlights managers' diverse information needs: "different costs for different purposes."²⁰ The Great Lakes example reveals that a number of challenges pervade TOC's ability to comply with this demand and to effectively support the range of decisions typical of enterprise optimization.

A NEW PARADIGM IN MA?

When pressed on these and other topics, proponents claim that there is more to TOC than just throughput and a global OE. However, details on such

other management accounting capabilities are scant. One interesting development, from an MA perspective, has been the introduction of multiple local OEs. A local OE, presumably, would comprise "non-totally variable costs" that are specific to a particular cost object or area of responsibility. The local OE creates a gray area in TOC; it acknowledges the need for the detailed cost objects but no clear rules or principles are provided that govern cost assignment to them.²¹

The opportunity cost and new technology adoption scenarios signal a significant shortfall on the part of TOC as a comprehensive management accounting approach. More change seems necessary, which will further challenge TOC's simplicity claims. The recognition for more sophistication also reveals that TOC proponents denigrate enterprise optimization by overselling a palatable simple solution. However, something much bigger than the simplicity issue is at stake. Pushing for more change in TOC, as has already occurred with the local OE, would be change of the wrong kind and for the wrong reason. The challenge for TOC is one of principle.

THE BIGGER CHALLENGE FOR TOC

The debate on principles in this article must be seen in the context of a peculiar development in management accounting. The vacuum in management accounting, after realizing in the mid 1980s that relevance was lost, has not been filled. Activity-based costing's gallant efforts notwithstanding, some production/manufacturing managers are in a concerted push for what they perceive as relevant monetary management information. The profession is experiencing a groundswell from production/manufacturing managers to establish relevant monetary information based on



principles in their discipline. Two high profile examples are TOC and lean accounting (LA).

This development comes with risks, such as imposing one's particular focus in the source discipline (operations/manufacturing) as the foundation of the target discipline (management accounting). Moreover, the danger also exists that a principle suitable to the optimization of a single constrained production line or appropriate to a particular manufacturing philosophy could be considered universally applicable to all aspects of decision science. In this regard, it is significant that LA and TOC espouse different guiding principles as the basis for their respective management accounting solutions. This sets the scene for conflicting decision support information; one problem, two principles—two different answers.

LA claims that lean manufacturing's flow-path principle should be the guiding principle behind monetary management information.²² The principle underlying TOC's monetary information is not so frankly stated. As discussed earlier, the first TOC test that governs cost assignment is *"does cost vary with one more or less unit of product?"* For more incisive decisions, that must use OE, the test is *"does OE change?"* TOC's test (does cost *"vary"* do OE costs change for the decision at hand²³) means the guiding principle behind its monetary decision support information is *relevance*. The formal definition for relevant costs is future costs that differ between decision alternatives.²⁴

Not surprisingly, the question whether relevance can serve as a guiding principle in management accounting has already been answered. Gordon Shillinglaw highlighted the problem with relevance as a

principle almost thirty years ago: *"While this (relevance) is a valid attribute of any system, it is not a very useful criterion. Usefulness to the user depends on what the user wants the cost figures to mean."*²⁵ By implication: relevant costs in one scenario (e.g., a throughput decision) might not be very useful or meaningful to the user in another scenario (e.g., a technology adoption decision). For example, in the Great Lakes decision, what is the usefulness of TOC's totally variable cost to management? Very little—only eight to twelve percent of the diesel fuel costs will be avoidable and none of the driver wages; the bulk of the relevant costs (maintenance material, labor, and lease costs) are buried in OE.

The problem for TOC is that the concept of relevance finds application only within the context of a decision, i.e., relevant costs are different depending on the decision a manager is making. Relevance as a guiding principle forces TOC down only one of many possible paths and locks down its monetary information in that context (throughput in this instance). However, managers make many different decisions; and asking what the relevant costs are for a different decision (e.g., a technology adoption decision) using TOC information cannot be satisfactorily answered; TOC's monetary information is already relevant in an exclusive context. This is why it cannot answer the opportunity cost question and why it is unable to comply with the *"different costs for different purposes"* requirement.

DIFFERENT COSTS FOR DIFFERENT PURPOSES

In decision science, proponents of management accounting approaches based on other disciplines face a very different playing field from their own. Moreover, in decision science they are dealing with a new and unique



ballgame; the principles are different, the audience is different, and the objectives are more than a singular maximization. Here, managers are required to juggle multiple goals simultaneously, including using *all* resources efficiently, reducing waste, evaluating new technologies, and minimizing input costs.

TOC's monetary information might be sufficient when dealing with machines, run-times and the throughput of physical products in a single constrained plant, but decision making at the enterprise level cannot and will not work in the *constrained* context (pun intended) represented by $T = P - TVC$. Variables at the enterprise level are often exogenous and uncontrollable; therefore, flexibility in information and dealing with uncertainty are integral aspects of decision making at this level. Competitors' actions, macroeconomic changes (e.g., crude oil prices), and new technologies that shift productivity and efficiency benchmarks require management accounting to present managers with information any way they want it.

The principle of causality has a long history as the basis for monetary decision support information.²⁶ Moreover, a management accounting approach predicated on the principle of causality effectively satisfies the "*different costs for different purposes*" requirement. Any approach that exclaims "out with the old; in with the new" justifies some skepticism: Why should the profession consider a different and overtly narrow principle, as the basis for monetary management information?

Moreover, TOC applies the scientific method and its principles inconsistently in management. Its use of relevance as the principle governing monetary information undermines its scientific method claims.

Causality (the recognition of causes and their effects), and not relevance, is the principle underlying the scientific method. TOC's own logic trees (i.e., its decision making tools) are entirely predicated on the principle of causality. Shouldn't managers' matching monetary information (the meta-language of the logic tree) be based on the same principle? Such use of causality would facilitate: 1) effective weighing of diverse decision alternatives; and 2) understanding their effects on the enterprise bottom line.

CONCLUSION

This article set out to highlight problems and inconsistencies in TOC due to its use of relevance as the guiding principle behind the monetary decision support information it provides. As was pointed out earlier, TOC cannot provide answers for the opportunity cost and technology adoption decision scenarios. This, surprisingly, might not be its Achilles heel since proponents merely have to admit to the approach's limitations and narrow focus (i.e., throughput over a constrained resource that governs an entire plant). The more pressing questions for TOC, however, are those dealing with principles appropriate to the decision science domain. Abandoning causality as a guiding principle for its monetary information results in a number of indefensible positions for TOC in its claim as a comprehensive management accounting approach:

1. An inability to optimize enterprise results under certain throughput scenarios;
2. Undermining its own core tenets (careless use of unconstrained resources heightens the possibility of interactive constraints);
3. Internal inconsistencies (i.e., local OEs with ambiguous rules that govern cost assignment to them);
4. An OE that lacks transparency and causal insight;



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5. Compromising its ability to aid managers in their analogous responsibilities (i.e., extrapolating cause and effect insights to glean potential future outcomes for a decision)²⁷;
6. An inability to comply with "*different costs for different purposes*" and to support a number of enterprise optimization decisions;
7. Inconsistency in its claim as the scientific method applied in management;
8. Traditional terminology is distorted and misused (e.g., the blended cost concept error); and
9. A resultant inability to effectively communicate with peers in the management accounting profession.

These inconsistencies require TOC to take a hard look at relevance as a basis for comprehensive monetary management information. Moreover, TOC's aspirations in the management accounting and decision science domains cannot be taken seriously, unless and until causality becomes a dominant feature of the monetary management information it provides.



NOTES

- ¹ A. van der Merwe, "The Management Accounting Philosophy Series II: Cornerstone Restoration," Cost Management Sep/Oct 2007: 26-33.
- ² T. Corbett, "Three Questions Accounting," Strategic Finance Apr. 2006: 48-55.
- ³ J. Caspari and P. Caspari, Management Dynamics: Merging Constraint Accounting to Drive Improvement (Hoboken, NJ: Wiley & Sons, Inc., 2004). Quote is from the inside flap.
- ⁴ T. McMullen, Introduction to the Theory of Constraints Management System (Boca Raton, FL: CRC Press, LLC., 1998) 47.
- ⁵ An overview of TOC and its roots can be found at <https://toc-goldratt.com/index.php?cont=13>
- ⁶ A fifth variable (I) is used for investments and inventory. "I" adds nothing to the discussion on a guiding principle for monetary management information and is therefore not addressed in this article.
- ⁷ M. Clark, Studies in the Economics of Overhead Costs (Chicago, IL: University of Chicago Press, 1923). Midway reprint 1981: 21.
- ⁸ Some in the TOC community acknowledge this fact. Refer, for example, Corbett page 52 in discussing the use of TOC totally variable cost in decision making he states: "*The use of the words "variable" and "cost" may be confusing because of the measures used in cost accounting.*"
- ⁹ Caspari 115-118. Discusses the effects of reducing the number of setups—"larger batches sizes imply fewer batches and less cost"—in traditional practice. An accompanying Exhibit 5.13 maps total costs to batch size showing a decrease in total cost as batch size increases. This is valid for a particular product viewed in isolation. However, if the labor cost associated with reduced setups is unavoidable (e.g., it equals a fraction of a person's time) there is clearly no reduction in total cost.
- ¹⁰ McMullen102. Refer also the local OE development in TOC discussed below, which seems to contradict this claim.
- ¹¹ Example adapted from A. van der Merwe, "The Management Accounting Philosophy Series: Gaping Holes in Our Foundation," Cost Management May/Jun 2007.
- ¹² *Opportunity cost* is the net cash flow forgone by selecting the next best resource application option. In estimating a resource's opportunity cost, the revenue the committed resource could otherwise have generated is often difficult to judge or simply unknown, as in the example. This is true particularly for decisions dealing with internal or support resources. However, an estimate of the committed resources' costs is readily available (in traditional systems). While the resource's cost is often unavoidable in these short-term decisions or common across all alternatives—and can therefore be ignored—the revenue the resource would otherwise generate should at least be more than its variable costs—to prevent a loss/ensure a contribution to fixed cost or profit. Resources' variable costs therefore serve as a consistent measure to approximate the opportunity costs of committing them to a particular course of action in mutually exclusive resource application scenarios. Using a resource's variable costs to approximate its opportunity cost is obviously a conservative approach but is prudent in light of the uncertainty factor inherent in the future revenues. See Shillinglaw below, page 77 for the definition of opportunity cost and also pages 84-94 for a more general discussion on the impact of cost variability on short-term resource allocation decisions and the use of the contribution margin concept.
- ¹³ Caspari 115. Caspari explains TOC's view on opportunity cost: "The major financial impact will always be in terms of potentially expanded or lost throughput." In an illustrative opportunity cost decision example this throughput centric view of the opportunity cost is reiterated (p.116); unconstrained labor resources are considered "fixed" (meaning unavoidable) and therefore not relevant. Moreover, there is some ambiguity in TOC's view on opportunity cost. In the glossary (p. 311) it is defined as profit forgone. However, a decision's profit is not equal to: 1) throughput (i.e.,

Notes continued on the next page.



profit has accounted for OE); or 2) the net cash flow that will result from the decision (i.e., profit includes noncash costs such as depreciation). It is also unclear how TOC would arrive at a profit for each decision alternative since this would require allocation of relevant OE cost components.

¹⁴ This would be the case in any scenario where an alternate application is available for unconstrained resources.

¹⁵ A review of TOC capable software products listed in the Google business directory revealed limited or no financial capabilities, i.e., they either focus solely on production scheduling functionality or rely on integration with an existing ERP system for financial source data.

¹⁶ Corbett 53.

¹⁷ Corbett 52.

¹⁸ Corbett 53.

¹⁹ Corbett 55. *"TOC doesn't assume that operating expense is fixed. It assumes that it isn't totally variable and that the time to analyze increases or decreases in OE is when we make decisions because decisions make costs vary."*

²⁰ Clark 175-201.

²¹ Corbett 100. Refers to *"trace"* and *"broken down"* expenses to local OE's. Allocations, however, are explicitly excluded. It is unclear how the three methods (tracing, breaking down, and allocating) differ or what the overriding cost assignment principle is that governs tracing and breaking down but nullifies allocation.

²² F. Kennedy and J. Huntzinger, "Lean Accounting for Operations," Target—Innovation at Work Vol. 21.No. 4. 2005: 8.

²³ As discussed earlier, TOC uses the terms *"vary"*, *"variable"*, *"increase/decrease"* and *"change"* as they relate to cost, synonymously in a decision context.

²⁴ D. Hansen and M. Mowen, Cost Management-Accounting and Control 4th Ed. (Mason, OH: South-Western, 2003) 1001. Note: TOC uses relevance inconsistently—see the opportunity cost scenario. This is a moot point, though, since the argument is that relevance is unsuitable—or at the very least impractical—as the guiding principle for a comprehensive management accounting approach.

²⁵ G. Shillinglaw, "Cost Accounting Principles for External Reporting: A Conceptual Framework," Essays to William A. Paton: Pioneer Accounting Theorist Edited by S. Zeff et al. (Ann Arbor, MI: University of Michigan, Division of Research, Graduate School of Business Administration, 1979) 157-183.

²⁶ Clark 216-232.

²⁷ Van der Merwe, "Cornerstone Restoration". For a discussion on the principle of analogy, its prevalence in managerial activities and the role causality plays in this regard.



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BIBLIOGRAPHY

- Caspari, J. A., & Caspari, P. (2004). *Management Dynamics: Merging Constraints Accounting to Drive Improvement*. Hoboken, NJ, United States of America: Wiley & Sons, Inc.
- Clark, J. M. (1923). *Studies in the Economics of Overhead Costs*. Chicago, IL, United States of America: The University of Chicago Press.
- Corbett, T. (2006). Three Questions Accounting. *Strategic Finance* (April), 48-55.
- Goldratt's Marketing Group. (2005-2008). *What is TOC?: About Theory of Constraints*. Retrieved November 2, 2007, from The World with Theory of Constraints: <http://www.toc-goldratt.com/index.php?cont=13>
- Hansen, D. R., & Mowen, M. M. (2003). *Cost Management: Accounting and Control* (4th ed.). Mason, OH, United States of America: South-Western College Publications.
- Kennedy, J., & Huntzinger, J. (2005). Lean Accounting for Operations. *Target - Innovation at Work*, Vol. 21 (Fourth Issue), 8.
- McMullen Jr., T. B. (1998). *Introduction to the Theory of Constraints (TOC) Management System*. Boca Raton, FL, United States of America: CRC Press Taylor & Francis Group.
- Shillinglaw, G. (1979). Cost Accounting Principles for External Reporting: A Conceptual Framework. In D. o. Graduate School of Business Administration, S. Zeff, J. Demski, & N. Dopuch (Eds.), *Essays to William A. Paton: Pioneer Accounting Theorist* (pp. 157-183). Ann Arbor, MI, United States of America: University of Michigan.
- Van der Merwe, A. (2007). The Management Accounting Philosophy Series I: Gaping Holes in Our Foundation. *Cost Management* (May/June), 5-11.
- Van der Merwe, A. (2007). The Management Accounting Philosophy Series II: Cornerstone Restoration. *Cost Management* (Sep/Oct), 26-33.
- Van der Merwe, A. (2007). The Management Accounting Philosophy Series III: Filling Up the Moat. *Cost Management* (Nov/Dec), 20-29.