



## Throughput Accounting A TOC Center White Paper



Throughput Accounting (TA) might be the biggest thing you've never heard of. For years managers have been searching for better financial tools for a host of management challenges, including performance measurement, product costing, and decision modeling. Driven by the realization that the old cost-based systems don't tell the whole story they have sought to remedy the situation with such approaches as Direct Costing, ABC/ABM, and Strategic Cost Management among many others. Still the search goes on.

TA is the first approach that factors in the most important element missing in all of the cost-based accounting approaches—Throughput. Throughput can be defined as the rate at which the company generates money through sales. Read any annual report, look at any company mission statement or talk with any top-executive and you will get the same message, we must increase Throughput. This is communicated in many ways but it is a growth orientation that strives to expand markets, products, customers, etc. No company aims to downsizing as its long-term corporate strategy. Yet nearly all of the financial tools available focus on costs, putting expense at the center of the decision-making and performance measurement process.

In nearly every accounting journal you will find articles and case studies highlighting the various shortcomings of the cost-based accounting systems. And any veteran financial manager will freely tell you of the flaws in the process and the need for extensive "interpretation" of the numbers to make sound decisions. Of course, cost-control is important, but no top-executive will tell you that it is the most important factor in achieving corporate sales and earnings growth.

TA addresses the need companies have felt for years to align all of their systems, particularly their financial systems with the Throughput focus of their strategy. A rapidly growing number of companies, and accounting experts agree that this is the avenue for building the real solution to the accounting problem. Articles have been appearing in accounting journals and management periodicals attesting to the real impact of TA—bottom line improvement. There are several books now on TA by thought leaders in the industry, including one co-sponsored by the Institute of Management Accountants and Price Waterhouse.

### Are Cost-Based Accounting Models Really Flawed?

This is a critical question that must be addressed—and not in academic terms, but in a real world setting. In other words, do cost-based models really hinder a company from making profits? The answer unfortunately is, yes, in a number of critical ways. And this goes for even the newest variant of this approach, Activity Based Costing/Management (ABC/ABM). As H.Thomas Johnson, co-author of the seminal work on the subject *Relevance Lost: The rise and Fall of Management Accounting*, wrote "The belief that...ABC improves a company's long-term performance is a delusion!"

Cost-based management accounting systems suffer initially from the fact that they focus almost all attention on controlling costs. TOC has clearly demonstrated the pivotal role of constraints in determining Throughput, and the need to synchronize everyone's efforts to support the constraint.

Throughput is only achieved from the coordinated efforts of all parts of the business—product development, sales, marketing, manufacturing, finance, etc. must all do their job to achieve Throughput. If any one “link” in this “chain” doesn't deliver, Throughput is in danger. The implication is that Throughput depends on the strength of the entire chain as a system, not on the isolated performance of a single “link.” Since a chain's strength is only that of its weakest link, this “constraint” determines the Throughput of the entire system. Other resources by definition have extra capacity versus the constraint. Cost-based systems fail to recognize the critical role of constraints and treat all areas as equally important.

Without defining the constraint, no cost system can consider the impact a local area has on the Throughput of the organization. Instead they actually drive management to sub-optimize performance everywhere with the almost inevitable result of reducing Throughput. Some illustrations will help:

- If an operation feeding a constraint elects to run a large batch of product to reduce its set-up cost, but in the process starves the constraint of work, the company's Throughput will go down. And did it really save anything by eliminating a set-up at a non-constraint, which by definition carries extra capacity versus the constraint?
- If manufacturing engineering discovers a way to speed up the process time at a non-constraint 5%, by purchasing some new tooling, will it lead to more Throughput for the company if the constraint remains unchanged? Will costs go down if we don't lay anyone off as a result?
- If purchasing finds a part at lower cost by going to a vendor who sometimes starves the constraint, is the company really better off? Unfortunately, the Purchasing Department will probably be rewarded for saving money on the part.

These accounting systems will nearly always show that an improvement was made in the local department. When these systems are used in the typical fashion to measure and motivate behavior, they actively create these sub-optimal decisions reducing Throughput. No cost-based system tells managers the impact of an action or decision on Throughput—a pivotal piece of missing information for good decisions. And this omission is being felt by every company striving to implement today's Throughput-oriented improvement initiatives—TQM, JIT, TOC, ERP, Lean, Supply Chain, etc. You cannot successfully implement a Throughput-oriented initiative by driving the business with cost-based measures and decision tools.

One of the most damaging things cost-based management accounting systems do is allocate costs to products. Every one of these systems, including ABC/ABM, attempts to link costs to the production of an incremental unit of Throughput. In other words, they try to claim that material, labor, and overhead costs vary directly with the volume of work produced. In reality, managers know that while material varies directly with volume (each additional unit produced requires additional raw materials), labor and overhead costs are typically fixed on

incremental volume. We do not routinely hire additional labor, increase the management ranks, or add new equipment and facilities just to handle another order from a customer. By the same token these costs do not go away simply because we have chosen not to produce a new order.

What is truly devastating here are the implications it has for organizations and how they operate. Even though every Controller knows not to fully trust the numbers his department provides, companies make critical decisions based on this information—how to price products, whether we should make or buy a component, whether a plant is profitable or not, where and how we should make additional investments, and a host of other key managerial issues.

Another damaging result of cost-based management accounting processes is the effort to capitalize costs by absorbing them into inventory. This creates the direct incentive to build inventories and creates a powerful dis-incentive to reduce them. The mechanism allows managers to overproduce in times of low demand and defer the labor and overhead portion of their costs until the products are sold. This creates the impression that a plant or company is more profitable in a period than it really is, and less profitable than it really is when it is selling off this excess inventory. More importantly, though, it motivates managers to build and maintain high inventories, exactly the opposite of what most cutting edge improvement methodologies like JIT, TQM, and TOC have shown to be required to be competitive today.

#### How did Cost Accounting Get to this State?

The historical roots of cost accounting and the assumptions on which it was based are well described in *Relevance Lost* and numerous other sources that have examined the subject in great depth. In brief, cost accounting was invented at a time when the vast majority of the costs involved in production were directly variable with the volume produced. Raw material and labor were the largest components of cost and labor was paid on a piece rate basis so every incremental unit produced required the payment of additional labor costs. Overhead was a very small fraction of the total costs. Today overhead is a large, sometimes even the major, component of cost, and labor is paid hourly, not by the piece. The assumptions on which the invention of cost accounting was based are no longer valid, and as they have changed over the years managers have become more and more sensitive to the shortcomings of their systems.

The shortcomings of cost-based models were borne out in our own research on the subject. Over the past 15 years, we surveyed thousands of managers in hundreds of companies and they all seem to employ the same fundamental decision-making model. Impossible, you say—we thought so too, but here is what they told us.

For making any important decision their company has an approved process or form to use. If a manager feels a decision is very important and will be of real value to the company, he crunches the numbers using the process. If the numbers justify the decision he wants he submits it for approval. But what if the numbers don't justify this decision? What do you think all of these managers told us they do? The answer was a resounding chorus that they would "re-visit the numbers," "sharpen our pencils," "change the assumptions," and a host of other euphemisms for make the numbers say what we think they should.

And when we asked why they felt the need to do this, they told us the same story again and again. The model available to them simply did not tell the whole story. The numbers they said could be massaged to say just about whatever they wanted them to. Consequently they felt the need to intervene and override the system to insure that the right actions were taken.

The process of making decisions in every company we surveyed over the past 15 years was a combination of: the company's approved, cost-based procedures plus a dose of management intuition as needed. The message was quite clear—no one trusted the system enough to allow it to make the decision on its own. Such an overwhelming consensus across industries, companies, functional areas, and managers cannot be an accident. And while all of these systems were cost-based, they were far from identical. Many included ABC/ABM techniques, others were direct cost based; there were an array of different allocation strategies and a host of different cost structures. The only common denominator was that they all sought to link cost to a decision as the primary criteria for making the decision.

### I thought ABC/ABM addressed these problems

So did a lot of people, and many proponents of ABC claimed as much. Shortly after achieving university tenure, Tom Johnson, who had worked closely with one of the developers of ABC, came out with his scathing article on the approach—"Let's set the Record Straight on ABC." His conclusion is unambiguous: "To become global competitors, American businesses must change the way managers think, and no cost system, not even ABC, will do that."

Extensive case studies on companies who have applied ABC have only shown that ABC systems produce data that leads to different decisions, not better ones. One of these did extensive research contrasting John Deere's old labor-based allocation system with its new ABC system. One of the divisions studied had considerable excess capacity in its operations and could effectively produce additional volume at only the cost of raw materials. The old cost system caused them to price work in such a way that they won 30% of their bids. The ABC system, in spite of the excess capacity that was clear to everyone, supplied different information from which they only won 14% of the new bids. Eric Noreen, the prominent author of numerous accounting textbooks, concluded from this study and all of his other research: "ABC systems provide costs that are misleading for decision-making purposes."

The fundamental problem with ABC is the same as with other cost-based approaches, it focuses on costs at the exclusion of Throughput, and it seeks to allocate costs, that are not totally variable, to products. The end result is data that do not match reality.

### Throughput Accounting

TA is not a costing system, although it does include processes for making more profitable pricing and sales/marketing decisions. It is a fundamental shift away from the focus on costs and the allocation of them to products. Companies have felt the need for a more responsive, more holistic system and TA addresses the needs of the enterprise as a whole.

The critical basis of TA comes directly from the Theory of Constraints principles. In particular it stems from the intuitively obvious conclusion that the focus of every company should be increasing Throughput. Shareholders and today's competitive markets dictate that companies must continually improve—in terms of profits, products, service, quality, everything. A cost-world focus, that puts primary emphasis on expense control, is inherently limited. There is only so far even the largest company can cut costs. And putting first priority on this effort is nothing more than a recipe for disaster in the long-term.

We all know intuitively that Throughput—generating more revenues through sales—should be the primary focus of companies. It is borne out in every mission statement and annual report we have ever seen. Unfortunately, most companies put cost first by dint of their accounting systems and the inertia of past practice. In most organizations this results in actions directly at odds with the stated corporate strategy that is always based on increasing Throughput. With Throughput as the proper focus of an organization, a different set of requirements emerges. The most central of which is an understanding of the organization's constraint. Secondly, one needs to understand how a change at a non-constraint will impact the constraint.

Before TOC came along managers were missing some critical information on which to base their decisions—there was no effective way to link the impact of an action or decision to the impact on Throughput. TOC by describing the role of constraints and non-constraints provided that link, makes it possible for the first time for managers to understand what would happen to Throughput. From this point it becomes much easier to evaluate the full financial impact of a decision. One can understand the impact of a potential action on Throughput through the constraint, which can then be weighed against the impact on Operating Expenses and finally compared against any required investment to determine the payback of an action. Throughput Accounting has emerged as the tool for managers to link decisions to their impact on all of the global financial measures—Throughput, Investment, and Operating Expense.

In contrast, the cost-based approach only shows the impact of an action on Operating Expense compared to Investment. Even here the figures are sometimes misleading, as most experienced manager know. Often these systems show a “cost reduction” in a local area when labor time is shaved off of an operation. However, if labor saved is not enough for the company to reduce its headcount, that savings goes completely unrealized—it is a phantom. Companies can have millions of dollars of annual “cost-savings” without impacting their bottom line at all.

Actions or decisions improving the constraint directly impact Throughput. Actions or decisions at non-constraints that do not help the constraint do not increase Throughput. By adding this critical piece Throughput Accounting enables managers to consider the full business ramifications of an action and make much more-informed choices. Without this understanding of the critical role of constraints, management accounting methods are doomed to only consider the cost side of the equation.

### The Implications of Throughput Accounting

The simple, common sense nature of the need to focus on Throughput, and the realization that constraints are of central importance, should not lead one to conclude that the implications

are in any way small. Like a rocket ship launched just a few seconds of a degree off-course will end up far from its target, so a misplaced fundamental assumption will result in actions far from the intended mark. Given the central role of management accounting in all business functions, the impact on the business of shifting to Throughput Accounting is great. Its effects are felt in all functions of the company, including: product costing/pricing, performance measurement, balance sheet statements, transfer pricing, investment justification, reward structures, and make/buy decisions.

Let's explore a few case studies as illustrations of the required shift and the impact it has on companies. Having touched on how the reward structures drive a local, cost focus, this is a good area in which to begin. With cost accounting underpinning our financial systems, rewards almost universally drive actions either directly aimed at reducing costs, or based on this data.

## **Company 1**

The company produces investment casting for the aerospace industry, for jet engines mostly. The castings pass through 70-80 steps from the start of manufacturing to completion. Prior to discovering Throughput Accounting, the primary measure in the company was "earned standard hours" in the plants. For each step on each part number there was a defined labor standard pinpointing the time it should take to complete that job. These standards were painstakingly determined by engineers making close observations of operators and through diligent effort to devise the most efficient process for each job on every part. Yet in spite of this careful effort, in reality the standards on parts varied widely—some were very difficult for operators to achieve, others much easier, and the rest just about fair. From the very top of the company, everyone measured and monitored earned hours as the number one indicator of company performance, the more hours, the better the performance.

The business reality was that the company's clients were becoming increasingly upset about the long lead times, missed deliveries, and generally poor service they received. One customer was so frustrated they were in the process of funding a start-up company to make the castings they needed to replace the company as its supplier. In spite of ever-improving earned standard hour figures, the company was getting further behind and losing more and more money.

The top-management came to recognize the impact their prime measure was having in driving local performance. Operators on the factory floor were "cherry-picking" jobs with easier standards, and re-work jobs (which earned no hours) were being buried deep in the piles of inventory. New work was continually jammed into the shop in spite of declining shipments giving operators even more work to choose from. But since easy-standard jobs were not universal on a part number all parts were delayed. Anyone receiving a tour of the plant would be shown the constraint resource that was not working as much as it was working.

The top-management instituted a global change in the measurement system from the local, cost-based earned hours metric, to a simple delivery date priority. It was the simplest and most crude shift to a Throughput focus imaginable, but it worked dramatically. Everyone in the company was educated in the impact of the old measures and the power of the new focus. The latest jobs became top-priority and work started to flow through the operation in half the lead

time of the previous periods. The company established a clear focus on the constraints in the process and drove actions to improve them. Outputs jumped dramatically and in the first year, the company went from borderline profitability to adding \$17 million to the bottom line. No people were hired and improvement efforts were directed to the most critical areas—the constraints—so all the money spent directly increased the company’s Throughput.

**Company 2**

Another example of shifting to a Throughput focused accounting approach can be seen in a printed circuit board company. Among the many shifts they undertook was to alter their approach to determining the most profitable products and mix to sell in the market. Like most, this company used to calculate product margins and profit by allocating labor and overhead costs to products. This gave them a picture of which products appeared to have the highest margins—contributing the most to profits. Once again this was a local focus, considering labor and overhead equally at all resources, as if there were no constraints.

The understanding of constraints brought with it the recognition that the central determinant of profit on a product was not margin, but the Throughput generated per hour of the constraint’s time. This concept, called Product Octane, became the new focus for determining profits on jobs, product families, and customers. This simple calculation showed a wide disparity between the lowest octane products and the highest. Even more importantly, many of the top products were previously seen as low margin items, and many high margin items were in fact low octane items. The table below shows some representative data.

	Margin	Octane
Product A	25%	\$50/constraint hour
Product B	2%	\$250/constraint hour
Product C	14%	\$1200/constraint hour

The figures were so surprising that management almost didn’t believe them. They went out to the shop floor to check them and were told that Product A was an awful product to produce—it went like molasses through the factory, particularly at the constraint. Product C on the other hand, they loved to see coming because it took very little time of the constraint and its lead time in the shop was very short.

Marketing strategies were re-directed to focus on the new high-octane products and considerable efforts were made to capture more of this business. The commission basis for sales people was changed from gross margins to octane, motivating new priorities. With this and its other Throughput-focused initiatives, the company grew from \$25 million in sales to over \$125 million, at a time when their industry as a whole was declining. The company was eventually taken public and subsequently sold, making its founders and shareholders extremely wealthy.

**Company 3**

Another example comes from a company producing components for heavy, over-the-road trucks. The central operating measure employed was labor absorption, intended as a global

measure of productivity. The assumption behind this metric was that if more work was being done on more inventory than the company would be better off. Unfortunately this metric drove actions that increased inventory, extended lead times, and building stock products at the expense of real customer orders.

A central driver of improvement actions was cost reductions. Manufacturing engineers would strive to reduce process times at any resource in the effort to lower the labor content of producing a part. Unfortunately, this was done across all operations, constraints and non-constraints alike. The end result was that many non-constraints were sped up, enabling them to process even more work than the constraints could digest. While absorption improved, inventory went up dramatically and it became increasingly difficult to meet delivery dates and to properly prioritize jobs in the factory. These local metrics were driving the company down an increasingly dangerous path—and managers were being rewarded for doing it.

With education in the Throughput concepts of TOC, the management began to view their actions in a different, clearer light—understanding the unavoidable outcomes of their actions. This led to a shift in the focus of the operation away from absorbing overheads, to increasing the velocity of work through the business. Immediate emphasis was given to the constraints where it was determined that a small investment (\$100,000) in the \$5 million dollar work center, with the addition of another employee per shift would yield an 80% increase in output. Under the previous accounting system this action would not have been justified as local output efficiency would have declined on a per labor hour basis. But the cost of the additional employee was trivial (about \$40,000 with fringes) versus the resulting Throughput, which was in the tens of millions of dollars per year. At the time they swore us to secrecy on their improvement, saying “the competition thinks you have to invest \$5 million dollars in an entire work center to get such a gain.”

#### **Company 4**

Another very interesting implication of cost based systems relates to how it misleads decisions regarding making or buying parts. Cost-based systems allocate expenses to the products to determine a product cost. This typically includes three major components: material, labor, and overhead (also called burden.) Back in the 1980's a large American conglomerate began to rigorously enforce a policy of purchasing from outside vendors all parts that were cheaper than they could produce in-house. This led to a broad effort to update costs and get quotes on all the parts in this multi-billion dollar company. Any part that could be purchased at a lower price than their own cost was trimmed and bought on the outside. The initial effort resulted in hundreds of parts being outsourced.

Shortly thereafter the company did another re-costing of the parts seeking further savings, as the first round had failed to erase in any way the growing red ink the company was mired in. As a result of the first round of outsourcing the company had been able to make a very small number of layoffs but had not been able to its overhead. Consequently the remaining parts now carried a larger amount of overhead and in the second re-costing many more were now cheaper to buy than to make and were once again outsourced. Not surprisingly this failed again to impact

in any way the company's bottom line, in fact the losses grew worse. And with the losses the shareholders grew more restless.

The next action employed was the final straw in this camel's back. Knowing that the greatest investment in the company was in its massive assembly plants, the President ordered around the clock production to better absorb the overhead in these plants. Considerable loans were secured in order to purchase sufficient parts to keep these operations running and they managed to run full out during the last part of that fiscal year. While the market for the company's products had not grown at all, the massive output of this period was forced onto the company's dealers, swelling their inventories and showing a massive profit on the company's bottom line. The President was rewarded with a staggering bonus for his efforts and the cost-based measures looked terrific.

Not knowing what to do next the President resigned and 6 months later the company, International Harvester, had to file for Chapter 11 bankruptcy protection. Tens of thousands of people were laid off as they shrunk to a fraction of their previous size and they felt compelled to change their name in the process. The real lesson of this sorry episode didn't reach most companies. While this is an extreme example, the fact remains that they followed their cost-based information religiously, rewarded their managers for doing so and it was the direct cause of the company's demise.

### The Way Forward

Before the advent of Throughput Accounting, organizations had little choice in how to drive improvement efforts. Productivity improvement was justified and directed according to a cost-based accounting system, which by definition focused attention on reducing costs and on local area improvements. If the productivity effort was directed primarily at a Throughput objective, the success of the program was often directly related to the ability of individuals to see between the lines and form their own decisions outside of the available cost data.

TA now offers a way to understand, analyze, and focus productivity improvement efforts based on their impact on cost **and** Throughput. Companies seeking to drive Throughput-based improvement should see the logic of using a similarly capable accounting/decision model to accomplish their aims. Without such an approach, efforts will continue to be scattered, misaligned, and ineffective. Recognizing this need is not sufficient in itself. Changing accounting models means altering the fundamental mechanism driving behavior in organizations. It requires people to understand and adopt a new mindset, with new tools, and ways of making decisions—no small task for an individual, much less an organization.

Fortunately most people already have strong intuition for how to operate in a Throughput manner. The challenge is to begin the journey toward TA, and it is management's responsibility to take the lead. With most organizations misaligned due to faulty, cost-based information, any steps toward a Throughput focus will produce results. The companies embarking on this shift will undoubtedly reap far greater returns from their productivity efforts, positioning themselves to become tomorrow's industry leaders. The time to start learning and implementing is now.