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# Real Cost Control

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Once the economy begins to improve, executives in many product development enterprises will strive to improve profitability not through force reductions but through significant increases in the capacity of their operations. In the name of speed to market and cycle time reduction, the same executives that cut jobs by the thousands earlier will waste many hundreds of millions of dollars annually. You should know that you can adopt a much more effective strategy for cost control **and** enhanced profitability. Rather than burning financial fuel by the ton, you can maximize shareholder value to levels that your wasteful competitors cannot even imagine, by focusing your improvement efforts.

A product development enterprise is not a collection of independent functions and projects. It is a continuous flow, multi-project system. Projects are introduced continually, and they are completed continually, much like the simple project plans in Figure 1 illustrate. The projects of such a continuous flow system tend to be completed not simultaneously but in sequence. The average interval between the completions of successive projects is determined always by the capacity of some key process.

Typically, this pace-setting process involves a small group of individual contributors, each of which has deep expertise in the product line of the enterprise. For example, the members of this group may be systems engineers or software architecture designers. Whatever the skill set of this pace-setting group, such a group can be identified nearly always in product development organizations.

One consequence of the existence of such a pace-setting process in product development is that the process essentially dictates the rate with which the new products of the enterprise generate new cash flows. For all practical purposes, this pace-setting process limits the ability of the enterprise to increase the rate of revenue generation, by limiting the rate with which it can introduce new products. Justifiably, such a process can be called the constraint of the entire enterprise.

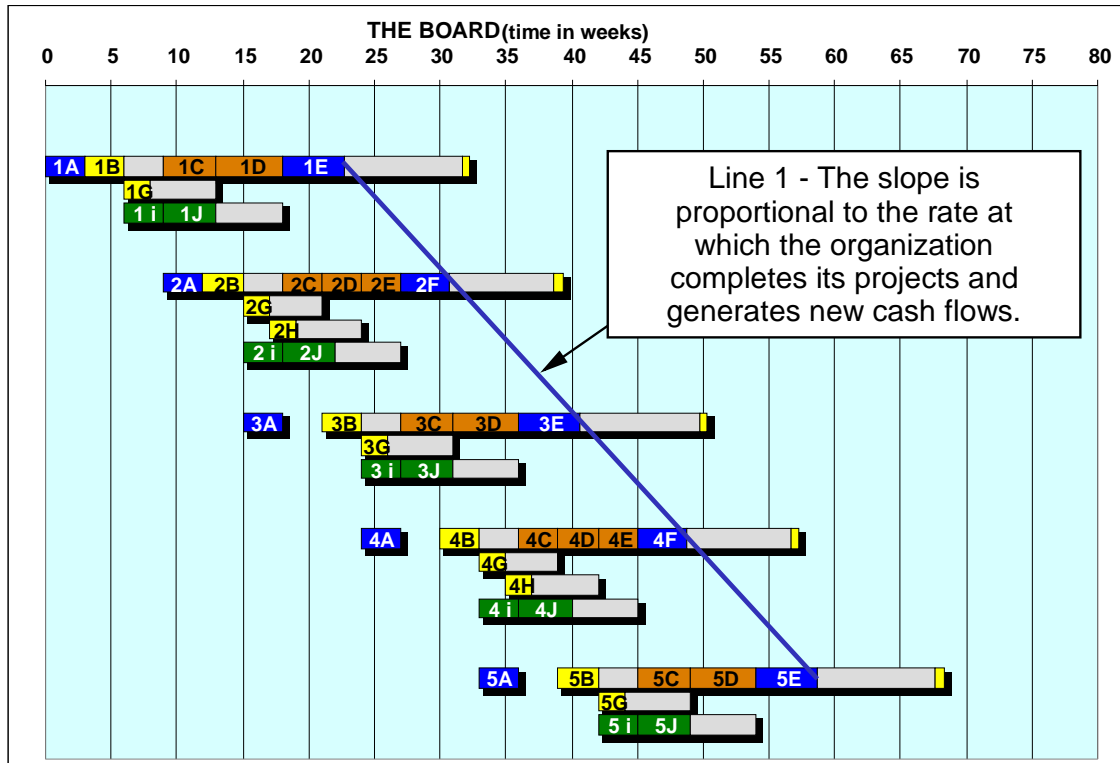


Figure 1: The average rate with which a new-product introduction enterprise generates revenue is limited by the rate with which the enterprise completes its projects and generates new cash flows.

For such a continuous flow system, the rate of completion of projects is a direct indicator of financial performance. The slope of the diagonal line in Figure 1, which indicates the average completion rate of the projects of the enterprise, is a measure of the average revenue-generation rate of which the enterprise is capable. A higher completion frequency, which would be indicated by a steeper slope, would cause a correspondingly higher rate of revenue generation. This is one reason why speed is important in new-product introduction. Thus, if you want to really improve the financial performance of your product development business, then you must focus on completing projects more frequently. But, you already know this, as do your wasteful competitors.

Here is what your competitors do not know. The conventional measurement of cycle time, as it is applied to a collection of individual projects today, gives us only an estimate of the average elapsed time from project start to project finish. It tells us nothing about the rate with which the enterprise completes projects and generates new

cash flows. In fact, it is quite possible to undertake expensive cycle time reduction programs that actually improve this misleading measurement and simultaneously damage profitability significantly and permanently.

For example, consider a cycle time reduction effort aimed at reducing process time for the trailing ends of all projects. Such an effort might require hiring additional staff in, say, the system testing area. Of course, hiring additional staff means increasing the operating expense rate of the enterprise and doing so permanently. Figure 2 shows the schedule performance impact of such an effort. On the surface, the effort appears to benefit the enterprise. All the projects are allowed to finish earlier by approximately the same interval. This means that all the cash flows associated with the projects shift toward the present by the same fixed interval, and the business gets its money sooner by that same interval.

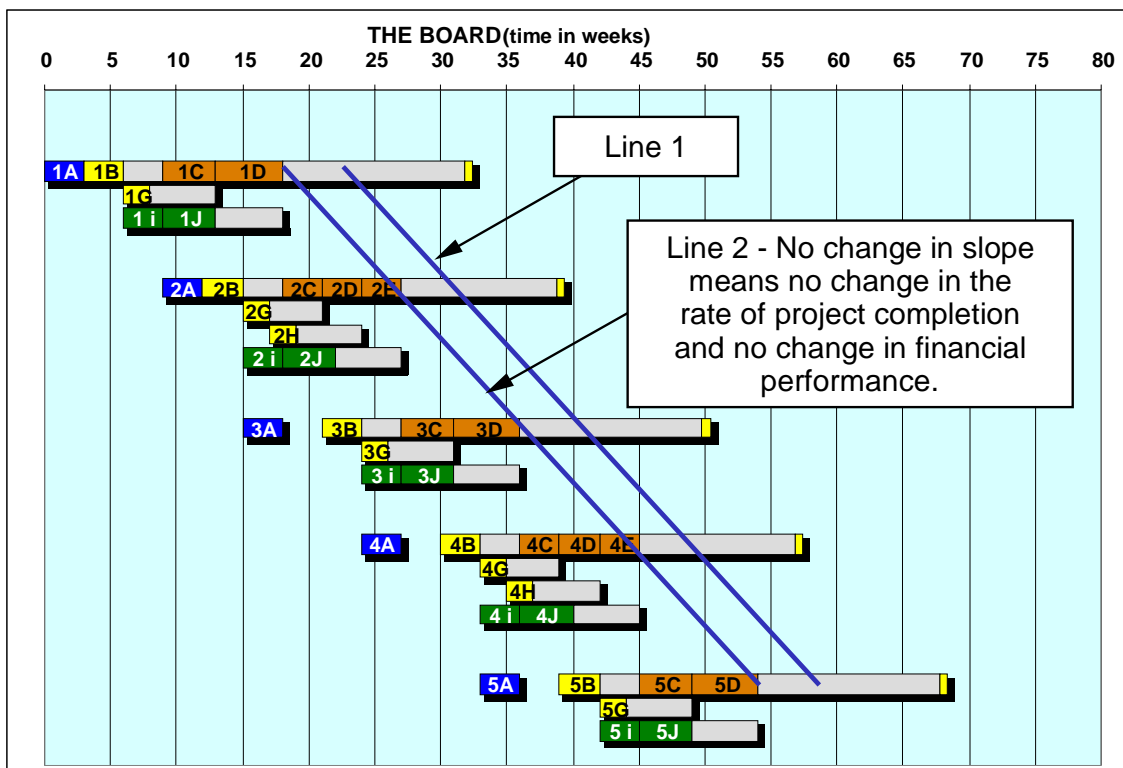


Figure 2: A cycle time reduction effort that improves the post-constraint processes of the enterprise has no impact on the *rate* of project completions.

However, the revenue generation rate of the enterprise is unchanged. We know this, because the rate of project completions is unchanged. This is indicated by the slope of the second line, which is coincident with the earlier completion times. The slope of the second line is identical to that of the original line. Thus, the financial performance of the business is not improved by the cycle time reduction effort. In fact, since this cycle time reduction effort requires additional hiring, which is accompanied by a permanent increase in the operating expense rate of the business, the cycle time reduction effort actually decreases profitability.

What about the shift of future revenue toward the present by that fixed interval? Doesn't that improve profitability? No! It does not. In this case, the shift of future revenue toward the present provides only a one-time contribution to net present value. It's a one-time event, nothing more. This is illustrated by Figure 3, which also shows the adverse impact on the operating expense rate and on profitability.

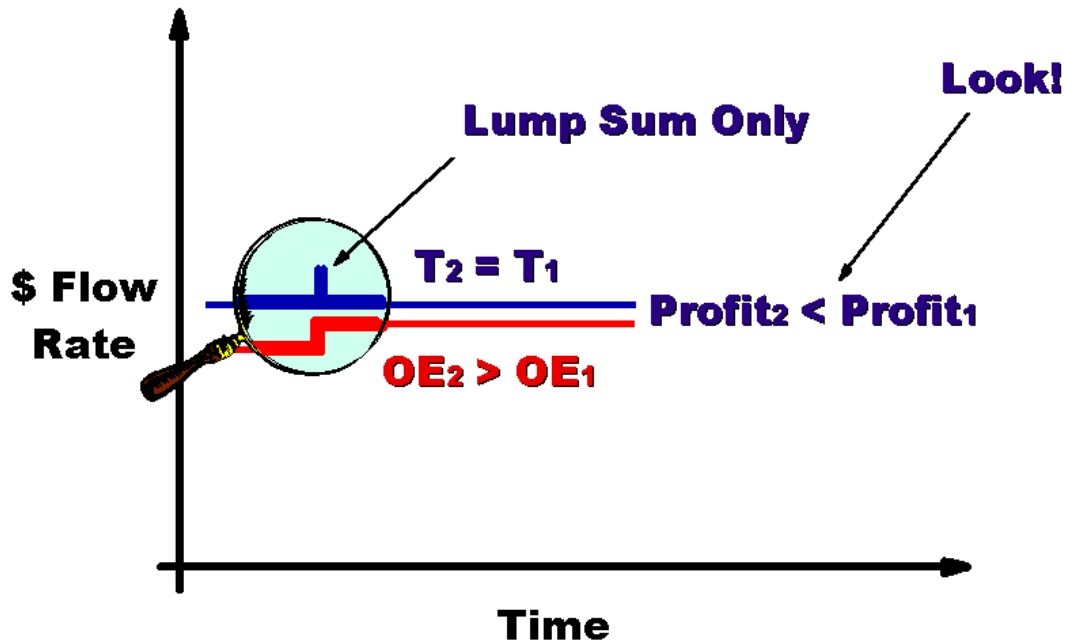


Figure 3: The financial effect of a post-constraint improvement in cycle time is only a one-time contribution to net present value. For this minor contribution, the enterprise suffers a permanent increase in its operating expense rate and an accompanying decrease in profitability.  $T_2$  and  $T_1$  denote "Throughput." This is the portion of revenue that stays with the enterprise, rather than being siphoned to suppliers.

So, what happened? Put simply, since the cycle time reduction effort focused on a non constraint process of the enterprise, its direct impact on financial performance was non existent; its indirect impact on financial performance was unfavorable. The resulting increase in the operating expense rate damaged profitability permanently, rather than improving it.

Now consider a cycle time reduction effort aimed at the pre-constraint segment of operations. It isn't unusual for resource managers to submit requests for more people, in response to a mountain of work. If that mountain of work happens to exist at a process that precedes the constraint of the enterprise, then the effect of hiring more people is to reduce the process time of the pre-constraint process. This is illustrated in Figure 4. As that figure shows, the constraint process continues to dictate the rate at which projects are completed and, consequently, the rate at which the enterprise generates revenue. However, in this case the enterprise doesn't see even the one-time

contribution to net present value. It sees only a permanent increase in its operating expense rate. Thus, even a cycle time reduction effort that really does reduce the traditional measurement of cycle time is likely to actually damage the profitability of your product development enterprise.

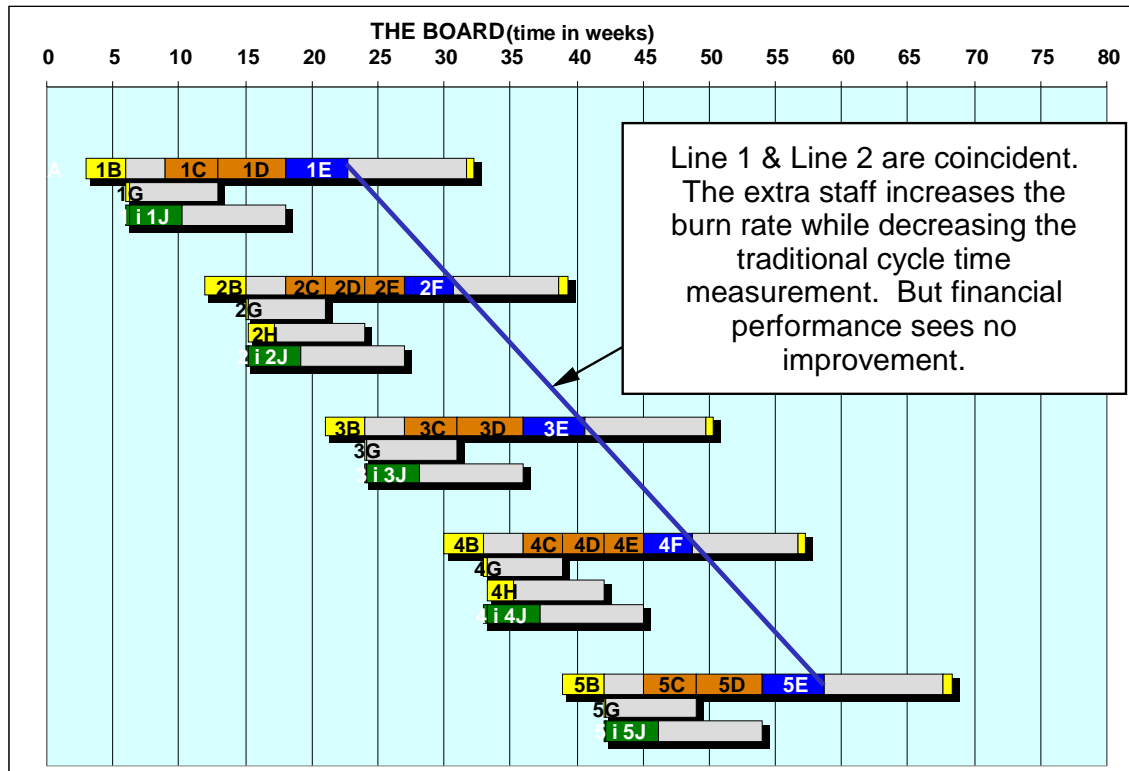


Figure 4: A cycle time reduction effort aimed at pre-constraint processes achieves nothing more than an increase in operating expenses. Cycle time may be reduced successfully. But the rate with which the enterprise completes its projects is unaffected by the cycle time reduction.

So far we've seen that your unsuspecting competitors are very likely to waste valuable financial fuel in fruitless efforts to improve a misleading measurement of cycle time. Even when they succeed in improving that misleading measurement, the effect often is at best only a one-time contribution to net present value; for that minor benefit their businesses suffer a real and permanent loss of profitability.

The reason for this unlucky set of events is the perception of a new-product introduction enterprise as a collection of independent projects. Of course, this mental model of a multi-project enterprise is inaccurate and highly misleading. It blocks your unfortunate competitors from thinking in terms of continuous flows of projects and *systems* of resources. Therefore, it prevents them from understanding the concept of a constraint process and the need to focus improvement efforts on that constraint process, whatever that constraint process might be.

Now that you understand this more effective operational model, consider an effort to improve cycle time directly at the constraint process of a new-product introduction business. We use our simple system for illustration purposes. The constraint process of our simple system is denoted by the red task bars in Figures 1, 2, 4, and 5.

Figure 5 shows the effect of our focused improvement effort. Since our effort was aimed directly at the constraint process, the resulting decrease in the cycle time of that process allowed us to complete our projects at a measurably faster rate. This is illustrated by the steeper slope of line 2.

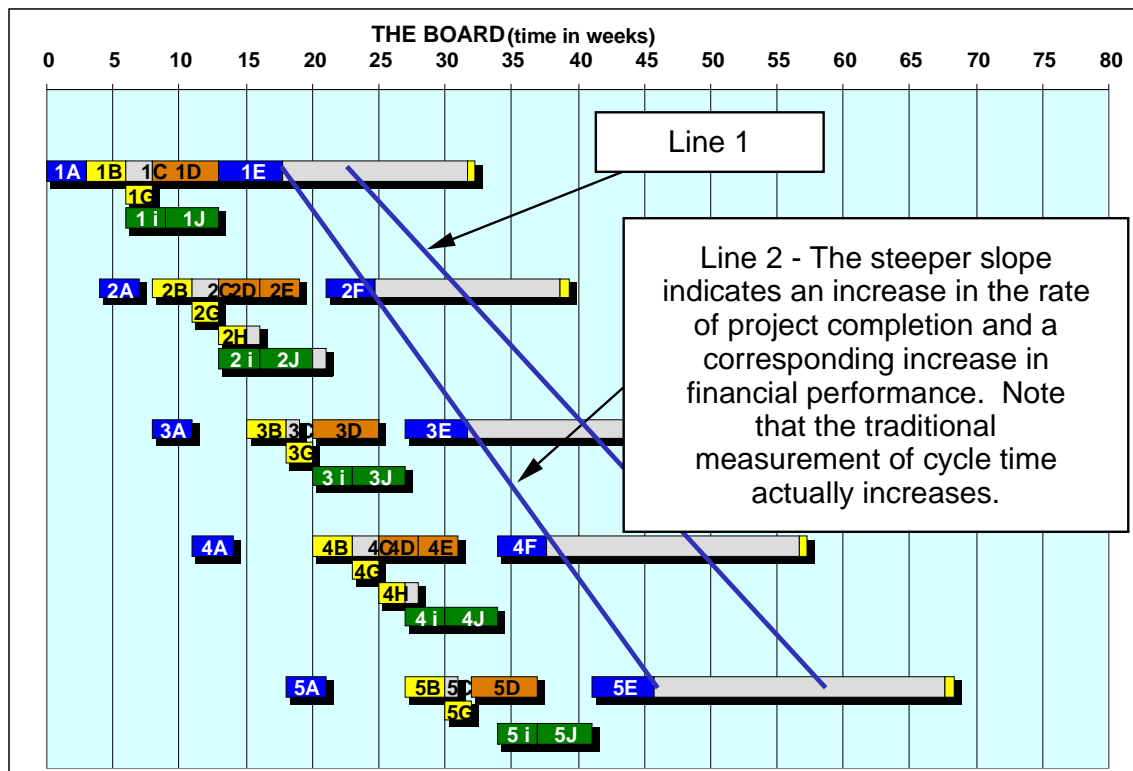


Figure 5: A cycle time reduction effort aimed at the constraint process of the enterprise has a direct impact on the rate with which the enterprise completes its projects. Consequently, the effect of the improvement effort on profitability is almost immediate and significant.

The financial impact of the focused improvement effort is illustrated in Figure 6, which shows not only the increase in the operating expense rate but also the disproportionately larger increase in the revenue generation rate of the enterprise. The net effect of the focused improvement effort is an increase in the profit generation rate of the business.

Now you see not only why your competitors waste precious financial fuel by the barrel but also how you can increase the financial performance of your product

development business, while simultaneously maintaining costs well under control. While your competitors continue their cycle of wasteful, unnecessary spending, followed by draconian cost reductions, you can effect real cost control, by avoiding the unnecessary spending entirely. Simultaneously, when you do increase the spending rate of your business, you do so with the assurance that your spending increase is a highly leveraged investment and is destined to increase the profitability of your business significantly and in short order.

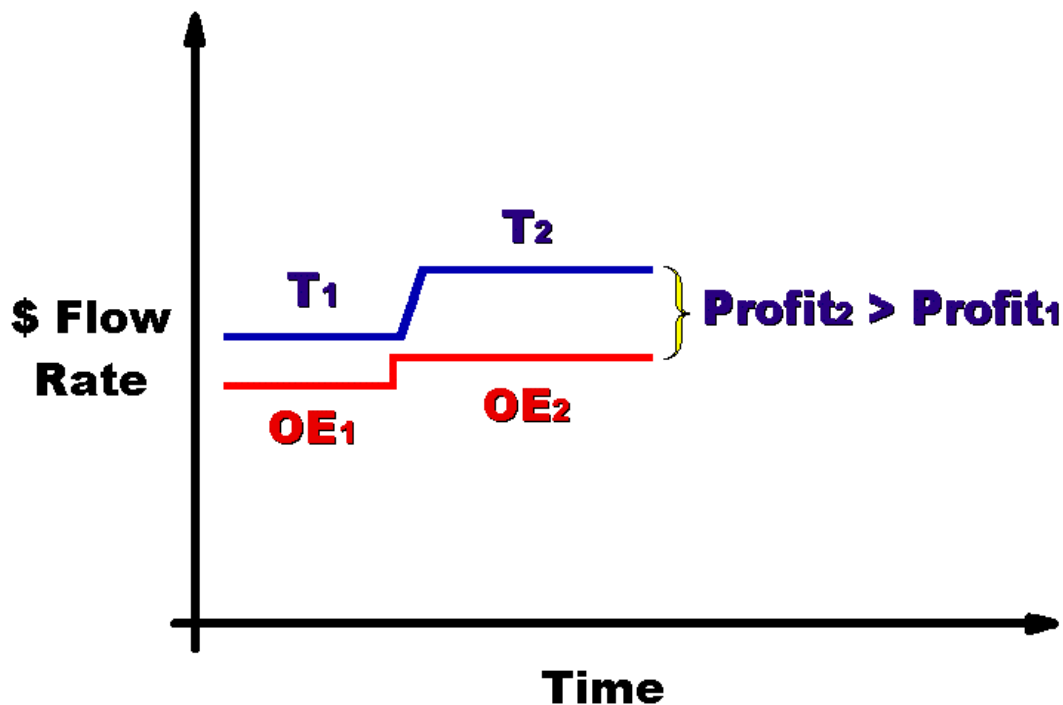


Figure 6: Although a cycle time reduction effort aimed at the constraint process of an enterprise might require an increase in the operating expense rate, that increase is accompanied by a disproportionately larger increase in revenue.

Further, continued use of this strategy leads to a steady sequence of financial performance improvements. If each improvement effort is aimed at the current constraint process of your product development enterprise, then you can achieve the kind of improvement in schedule performance indicated in Figure 7. That figure shows the effect of improving the process represented by the green task bars, at the time that that process is the constraint of the enterprise. Notice that line 3 is even steeper than line 2. This indicates yet another increase in the completion rate of the projects of the enterprise.

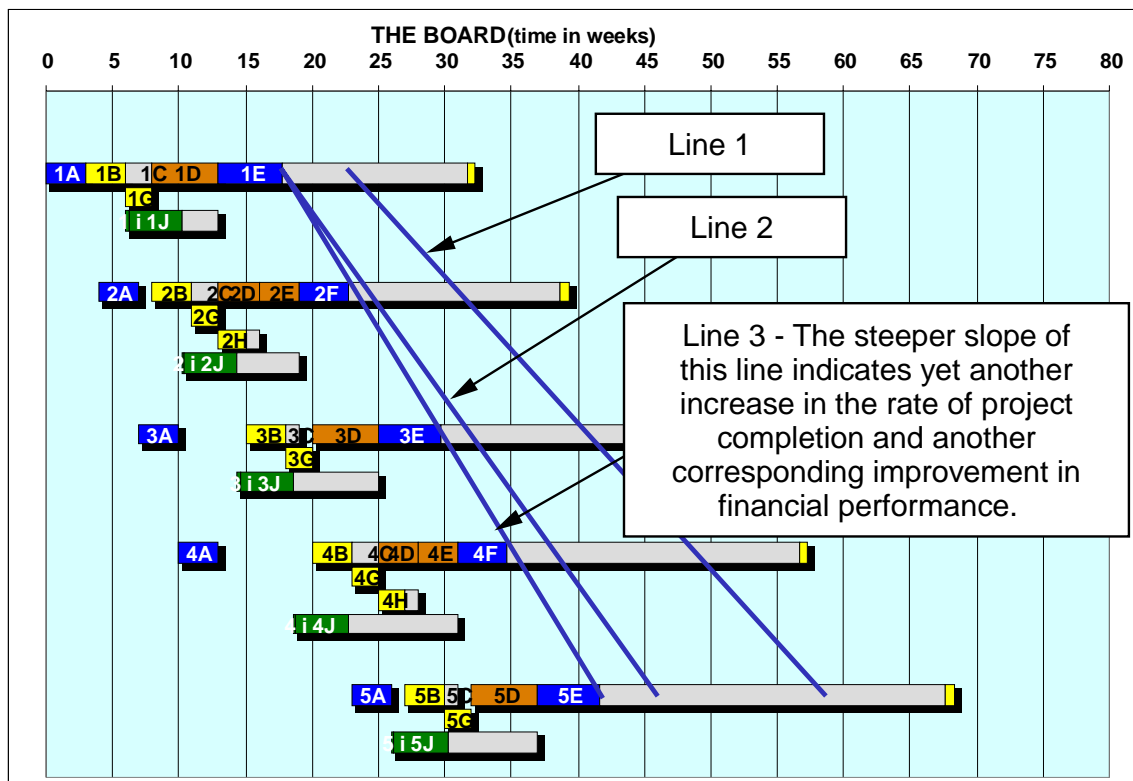


Figure 7: Improvement efforts focused continually on the constraint of the enterprise provide ongoing improvements in the rate of project completion.

The financial performance profile created by such a sequence of focused improvements is illustrated in Figure 8. As that figure shows, each spending increase that improves the performance of the constraint of the enterprise is followed immediately by a disproportionately larger improvement in financial performance. All the other processes of the enterprise, of course, need zero additional spending. They are not constraint processes. This is how you can avoid spending valuable profit dollars before you earn them, unlike your more traditional competitors who continue to think that an improvement anywhere is an improvement for the entire enterprise.

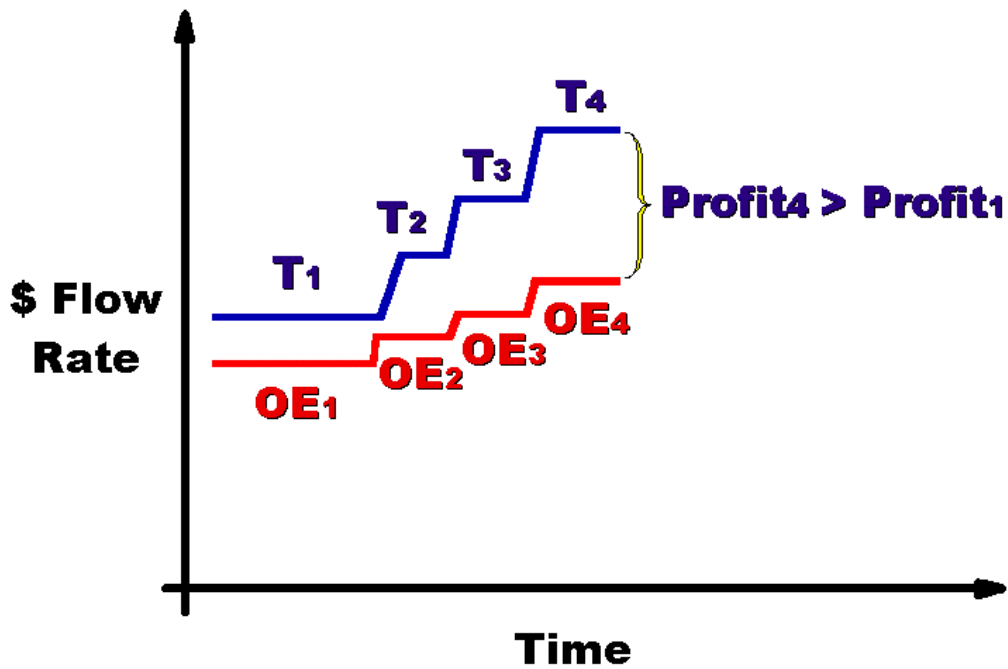


Figure 8: Continual increases in the rate of project completion are accompanied by increases in the rate of revenue generation. These are always more than enough to offset required increases in operating expenses. The latter, since they are directed solely at the constraint of the enterprise, are held to a minimum.

Finally, consider the benefits of achieving such process improvements not through hiring but through, say, a Six-Sigma program that focuses continually on the constraint of your business. By focusing such process improvement technologies as Six-Sigma on the constraint, you can achieve the desired increases in financial performance with essentially constant operating expenses. In other words, you get the bang even without spending the buck, as illustrated in Figure 9.

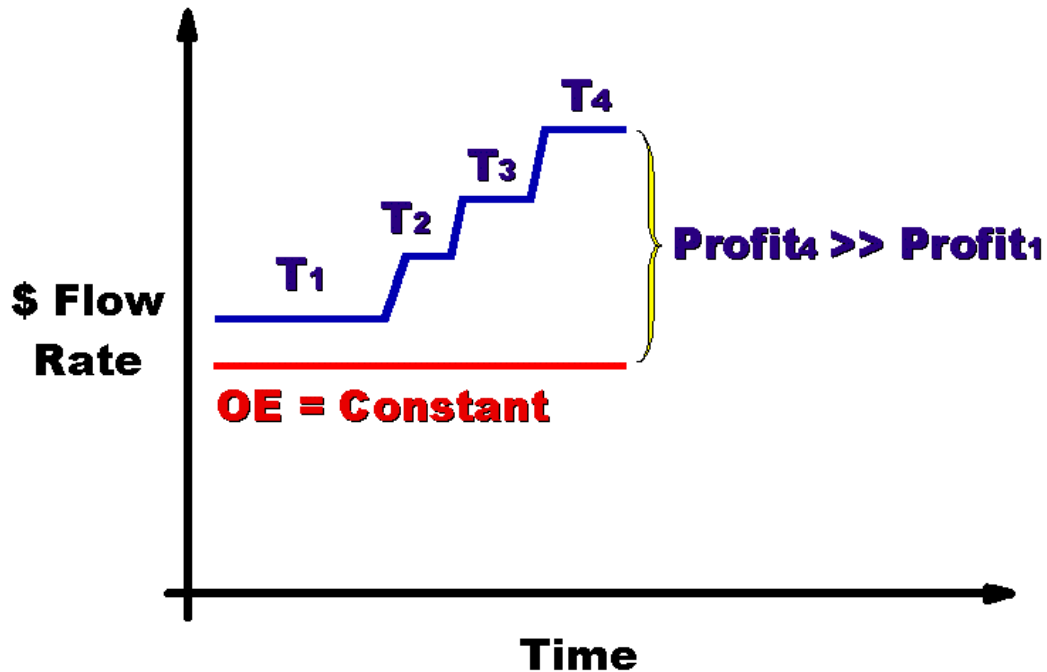


Figure 9: Efforts like the currently popular Six-Sigma programs can contribute as well, if they too are focused on the constraint of the enterprise.

Speed to market is vitally important for companies that live or die by new-product introduction. But unfocused improvement efforts, aimed at reducing a misleading cycle time measurement, do nothing more than waste profits even before those profits are earned. Conversely, a knowledgeable approach, which strives not to reduce the conventional cycle time measurement but to increase the rate of project completion, by focusing improvement efforts at the constraint of the enterprise, can boost shareholder value to exceedingly high levels while truly maintaining costs under tight control.

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**About the author:**

Tony Rizzo joined Bell Labs in 1983, as a Mechanical Engineer. For most of his career in Bell Labs, Tony functioned as an internal finite element analysis consultant. In 1994, Tony was introduced to the work of Dr. E. M. Goldratt and the Theory of Constraints (TOC). Shortly thereafter Tony left his successful technical career in favor of a career in management consulting, specializing in TOC-based consulting and training for new-product introduction organizations, still with Lucent Technologies. Tony has studied Dr. Goldratt's work extensively since 1994; he has spent much effort adapting Dr. Goldratt's work to product development organizations and is responsible for bringing the TOC Multi-Project Management Method to a number of the businesses. Today Tony runs the Product Development Institute, an independent leadership consulting firm specializing in

the implementation of the Critical Chain method and the TOC Multi-Project Management method.