



## A SYSTEMIC PATH TO LEAN MANAGEMENT

BY H. THOMAS JOHNSON

**B**usinesses everywhere have given enormous attention to “lean” management programs for over a decade. However, none emulates what Toyota, the creator of lean, has achieved. To be sure, many businesses temporarily improve their performance, some greatly, by adopting Toyota practices. But none succeeds as Toyota has at continuously improving lead time, cost, productivity, quality, and overall financial performance year after year, for decades.

All businesses desire high and stable profitability, period after period for as long as possible. That surely is the goal of most performance improvement programs, including lean initiatives. However, such programs invariably boost profitability for only a while, followed by increasing instability and reduced performance until the cycle repeats and management once again rolls out another improvement program. Again, profitability increases for a while, followed by another disappointing downturn that leads to yet another improvement program. As a consequence of such improvement-initiative cycles, average results over the long term move in the opposite direction to the desired result, despite brief periods of improvement in the short run.

### TEAM TIP

With your team, pretend that you wake up in a world where we no longer can use numbers or quantitative measures. How would you define the purpose of your organization? What would you tell people is important?

### Unintended Consequences of Improvement

I believe this unintended consequence of improvement initiatives occurs because management’s view of what causes business results differs greatly from how the business system itself would naturally produce those results. In virtually all businesses today, and for the past 50 years or more, management actions meant to improve financial performance reflect a mechanistic view of what causes financial results. In that view, financial results are a linear, additive sum of independent contributions from different parts of the business.

In other words, managers believe that reducing an operation’s annual cost by \$1 million simply requires them to manipulate parts of the business that generate spending in that amount each year. Because managers assume that all parts of their operations make independent contributions to overall financial performance, like the parts of a machine, they would consider any or all of the following steps to be equally effective: lay off employees whose annual pay equals \$1 million; force suppliers to accept reduced prices for their goods or services; outsource employment or contract purchases to less-developed countries. It doesn’t matter what steps are chosen, as long as they eliminate \$1 million of annual spending.

Were managers to assume, however, that the financial performance of business operations results from a pattern of relationships among a community of interrelated parts, and is not merely the sum of individual contributions from a collection of independent parts, their approach to reducing cost could be entirely different. In that case, managers might attempt to reduce costs by improving the system of relationships that determines how the business con-

sumes resources to meet customer requirements. This would suggest that they view “improvement” primarily in terms of a system of relationships—the human social system that is the business—and not simply in terms of an arithmetic sum of separate parts. Viewing current operations through the lens of this vision would enable everyone in the organization to see the direction that change must take to move operations closer to that vision.

However, such thinking has not yet influenced business education and practice. Indeed, the thinking and behavior of almost all managers in today’s business world reflect a worldview grounded in the whole-equals-sum-of-parts and win-lose competitive principles of 19th-century mechanics and 18th-century classical physics, not the systemic, cooperative, and win-win symbiotic principles of 21st-century cosmology and life science. That explains, I believe, why virtually all improvement initiatives, including so-called lean initiatives, inevitably generate long-run financial results that fall far short of what was intended by the initiatives’ designers.

### Confusion of Levels

This failure has to do with a “confusion of levels,” a phrase writers often use to describe what the 20th-century systems thinker Gregory Bateson called a type of *epistemological error*. Bateson said that humans in any culture share certain premises about epistemology, that is, “about the nature of knowing and the nature of the universe in which we live and how we know about it” (Gregory Bateson, *Steps to an Ecology of Mind*, p. 478). Many of these premises, because they work at some levels and under certain circumstances, are misapplied to other levels. Problems occur when this happens.

People in Western cultures have premises for explaining or understanding the world at two main levels, referred to briefly above. At one level, call it the *mechanical*, all events are explained by the influence of external force or impact on independent objects. At the other level, call it the *living*, all events are explained by patterns of relationships connecting a world of self-organizing beings. The premises at the first level have been successfully used for nearly two centuries to study mechanical processes and to promote engineering technology. They are the basis for scientific and business education and practice in the Western world today.

But problems have grown increasingly severe from the erroneous application of these premises to human dealings with nature and to social organizations, such as businesses, that embody principles of living systems. For example, viewing reality through the premises of the first level, a management accountant in modern business views a *spreadsheet of financial results* as the company. Oblivious to premises at the second level, this person fails to see the *system of human relationships* that produces those financial results as the company. As a consequence, the person promotes policies to “improve financial results” by arbitrarily destroying relationships through layoffs or outsourcing, not by nurturing and reinforcing the features of those relationships that produce robust results. The long-term outcome, predictably, is less than expected.

## Lean Practices Versus Toyota Results

In their customary way of doing things in business, managers confuse linear cause-effect connections at the abstract quantitative level of financial results with the nonlinear, complex cause-effect connections that naturally exist at the concrete level of relationships among employees, suppliers, customers, owners, and community. Their business training and experience cause managers to believe that linear cause-effect connections at the abstract quantitative level apply everywhere in the world, including the level of real operations. Thus, they proceed to manipulate and

control people and things according to the linear principles that apply at the abstract quantitative level.

Therein lies another confusion of levels. Whereas in a mechanical system, one-dimensional quantities can both describe results and enable one to control the linear process that produces those results, in a living system, quantities can only describe results, but cannot explain or enable one to control the multi-dimensional interactions and feedback loops of the process that produces the results. As I discuss in more detail below, this confusion of levels invalidates all management accounting practices in which businesses attempt to use financial quantities to explain and control financial results. Those practices, which are endemic to American management but are not evident at Toyota, are the main reason why lean initiatives fail to have their desired impact on financial performance in American business.

An example of the damaging impact of this confusion is in a case (co-authored with MIT Professor David Cochran) I describe elsewhere that compares the financial (and other quantitative) results in two automobile bumper-making plants (H. Thomas Johnson, “Lean Accounting: To Become Lean, Shed Accounting,” *Cost Management*, Jan/Feb 2006, pp. 3-17). One is run by an American “Big Three” automaker whose managers continually manipulate separate parts of the plant’s operations and arbitrarily increase output in order to achieve unit cost targets defined by an abstract financial cost equation. The other is run by Toyota, whose managers focus on nurturing systemic relationships in the plant according to a constant vision that has guided all operations in the company for many decades. The case demonstrates that Toyota does not confuse linear cause-effect connections at the abstract level of financial cost equations with the complex cause-effect connections at the concrete operating level of human relationships and that it, in turn, achieves lower costs and higher overall performance.

I believe lean initiatives fail to achieve results like those observed at Toyota because they do not change the underlying mechanistic thinking that

has guided management decisions in virtually all American businesses for the past half century or more. Lean initiatives in non-Toyota companies invariably fail to embody Toyota’s unique way of thinking about business and the fundamentally different approach to management. Thus, businesses transplant Toyota practices into a context of alien thinking that overpowers and dilutes their effectiveness. As a consequence, such companies can demonstrate Toyota-style management practices, but not Toyota performance results.

## “Going to the Place”

The prevalence of management accounting control systems in American business probably contributes more than any single thing to the confusion of levels that causes managers to believe they can run operations mechanically by chasing financial targets, not by nurturing and improving the underlying system of human relationships from which such results emerge. It is significant, then, to note that Toyota doesn’t use management accounting targets (or “levers”) to control or motivate operations. I argue that this is an important reason why Toyota’s financial performance is unsurpassed in its industry.

People at Toyota place great importance on *genchi genbutsu*, or “going to the place” where the problem occurs to see it firsthand. They don’t rely on second-hand reports or charts of data to get true understanding of root cause. Instead, they go to the place (*gemba*) where they can watch, observe, and “ask *why* five times.” This attitude shows a deep appreciation that results (and problems) ultimately emanate from and are explained by complex processes and concrete relationships.

Managers in a Toyota plant, unlike their counterparts in American organizations, do not refer to accounting documents such as standard cost variance budgets to discuss the state of current operations. Indeed, in 1992, during my first of scores of trips to Toyota’s Georgetown, Kentucky plant, I was told that the Toyota accounting system treats daily plant operations essentially as a “black box” that it does not enter. Accountants of course record every-

thing that goes into the plant and all the products that come out. But within the plant they don't track the flow between incoming resources and outgoing finished product. Everything one needs to know about the transformation that takes place inside the plant is inherent in the flow of the work itself. Indeed, a key feature of the Toyota Production System is that the work itself provides the information needed to control its state.

Professor Kazuhiro Mishina introduced me to this aspect of the Toyota Production System (TPS) in 1992 when he showed me a high-level "material and information flow map" for the Georgetown plant. He explained that the map is designed to show material flowing from left (raw material) to right (finished autos) and information flowing from right to left. Basically there was only one line going from right to left—a line to represent the customers' orders entering the plant each day and going directly to the body-welding operation. Today this type of map is familiar to anyone who has studied "value-stream mapping." But Kazuhiro pointed out to me that no lines representing information enter the plant from either the accounting system or the production control system. The work itself provides all the information that in non-Toyota plants customarily comes from computerized material requirements planning (MRP) and standard cost variance reports.

While the value-stream mapping literature does an excellent job of showing how the TPS dispenses with the need for production controls in daily operations, it is silent on how the TPS also dispenses with the need for accounting controls in daily operations. This is an unfortunate lapse, in my opinion, because it has left the door open to the idea that lean manufacturing programs must include lean accounting controls.

In Toyota plants, all information needed to control operations is in the work, simply because all work flows continuously at a balanced rate through virtually every operation, from the beginning to the end of the manufacturing process. The work has been carefully designed so that one can "see"

its current state quite literally. Is it on time to meet the day's orders? If not, how much additional time will be needed? Have defects or other errors occurred along the way? Are components to final assembly being replenished on a timely basis? Has any undue inventory accumulated anywhere? Are problems being identified and addressed according to standard procedures? Such questions, and hundreds more, can be answered every moment in every step of the process throughout the plant. Any "exceptions" that managers might need to address to keep financial results on track are visible real time as the work is being done, not days, weeks, or months later in a report from the accounting department.

### The Wrong Question

If traditional management accounting practices are the key problem preventing American businesses from emulating Toyota's performance, what should companies do? Many proponents of lean accounting suggest that companies should reform management accounting itself by doing things such as activity-based value-stream costing, direct costing, cash-flow accounting, value-add capacity analysis, and more. These proposals should cause a sense of *deja vu* among those who are old enough to recall the proposals 20 years ago to gain better control over burgeoning overhead costs with activity-based cost (ABC) information. ABC seemed like a good idea at the time, but in retrospect it was a good answer to the wrong question. We see better today, when we understand more fully what Toyota does, that reducing manufacturing overhead costs requires a new way to organize work, not better cost information. The question that proponents of ABC should have been asking was how to organize work to eliminate the causes of overhead activity, not how to trace costs of overhead activities to products in more discriminating ways.

The question most companies ask now is how to control the financial results of business operations, as if financial results are a linear sum of individual contributions from separate parts of the business. Accounting control information seems the logical way

to show how those contributions, and changes in those contributions, add up to the organization's overall financial results. But if we assume that financial results emerge from complex interactions and nonlinear feedback loops in the interrelated parts of a natural living system, then attempting to control those results with linear accounting information is not only erroneous, but possibly destructive to the system's operations in the long run. In this case, the new question is: How does one control, if at all, the financial results that emerge from operations that abide by the principles that govern a natural living system?

### Managing by Means

An early answer to this question was provided in the 1930s and 1940s by Walter Shewhart and W. Edwards Deming, both trained in mathematical physics and experienced in using state-of-the-art statistical tools in business and government. One of their lasting contributions was to devise a scientific way to estimate the "control limits" within which a business system's results would normally fall until one of two steps were taken that altered the limits. One step was to ignore all but abnormal variation in results and work to improve the system itself, thereby narrowing the control limits and improving long-term performance. The other step, a less desirable but more common way of managing, was to try to improve long-term performance by intervening in the system every time results varied from a desired target. The inevitable consequence of the second step, Shewhart and Deming proved, is to widen the system's control limits and impair its long-term performance.

In essence, Shewhart and Deming likened a well-designed business system to a living system in nature. Its results vary over time, but the range of variation has limits. However, in a human system such as the operations of a business, managers can improve performance by taking steps to reduce that range of variation. The key to performance improvement, then, is to nurture the system that produces results, not to drive the system to achieve targets that fall outside its normal performance lim-

its. In his early work, Deming articulated 14 principles (or points) that defined what he meant by nurturing the system. Those principles included things such as create constancy of purpose, constantly improve systems by reducing variation, cease dependence on inspection, do not base purchases on price alone, do not reward individual performance, institute training, eliminate management by objectives, and more.

This is precisely the approach that Toyota takes to manage its operations. Toyota lives by a set of deep underlying systems principles that I tried to sum up in my own words with the concept “managing by means.” As I outlined it in my book *Profit Beyond Measure*, the essence of that concept is that satisfactory business results follow from nurturing the company’s system (the “means”), not from manipulating its processes to achieve pre-determined financial results (a mechanistic strategy popularly known as “managing by results”). In other words, nurture the process and satisfactory results will follow.

This sentiment is central to Toyota’s deep-seated belief that one cannot improve financial performance by intervening in the system and forcing operations people to achieve results targets. Instead, they emphasize the importance of defining the properties their operating system should manifest and of having everyone in the organization work assiduously to move the system toward those properties. Toyota people frequently refer to those properties as “True North.” True North in Toyota’s system includes safety, moving work always in a continuous flow, one order at a time on time, with no defects, with all steps adding value, and with the lowest consumption of resources possible. The assumption is that the more that every process in the system manifests the properties of True North, the better will be the company’s long-term performance.

These three approaches to managing operations—the Shewhart-Deming approach, managing by means (MBM), and Toyota’s approach—all suggest how different it is to nurture the system that produces a company’s financial results than it is to arbitrarily intervene in and

wrench the system in an attempt to force it to produce a desired result beyond its current capabilities. The latter strategy is, of course, followed by virtually all large companies in the United States today, especially the large publicly traded companies whose top managers are pressured to deliver results demanded by financial markets and other outside interests. Many of those companies are pursuing lean initiatives in the expectation of achieving performance like Toyota’s. The fact that they will not or cannot forego pressure to drive operations with management accounting “levers of control” makes the likelihood of their realizing such expectations nearly zero.

### Accounting Controls or System Principles?

If managers look primarily at financial information to judge the performance of a business, then they are certain to be working in the dark. Financial quantities cannot reveal if a system is improving or not. To assume otherwise is to fall prey to confusion of levels. If a company requires cost information to show the “savings” from “going lean,” it will never get there. When managers look at cost information in order to eliminate unfavorable unit cost variances, they discourage people from continuously removing sources of delay and error. Instead, employees will create workarounds such as rework loops, forks, and inventory to keep work moving (even if it is not continuously flowing). In other words, the demand to justify operational decisions with cost information causes people to forego root-cause problem solving and, instead, to build “cost-effective” workarounds that violate systems principles. Eventually the systems principles are forgotten, and managers spend increasing amounts of time working to improve the efficiency of the workarounds.

No company that talks about improving performance can know what it is doing if its primary window on results is financial information and not natural system principles. No amount of financial manipulation will ever improve long-term results. The dilemma facing all companies that intend to become lean is that they can

follow a truly systemic path to lean or they can continue to use management accounting “levers of control.” They can’t do both.

### Life-Enhancing, Not Life-Denying, Businesses

Management accounting controls impose a curse on lean management programs; they cause managers to believe that addressing the imperative of growth is compatible with the possibility of systemic well-being. Abstract quantities by themselves can of course grow without limit. However, the universe has never allowed any real, concrete system to grow endlessly. Such attempts inevitably fail.

Nevertheless, all businesses that chase accounting targets for revenue, cost, profit, or return on investment somehow believe they are an exception to this universal pattern. They are deaf to the primordial message being delivered every time their real operations fail to deliver the long-term performance that their abstract equations and their occasionally favorable short-term returns seem to promise. They fail to see that the pursuit of endless growth is incompatible with the long-term survival of the system.

This message applies to the entire human economy as well as to individual businesses. Even if every company in the world were to become as lean as Toyota, the economy in which they operate is not sustainable. Forces drive it to focus on quantitative goals, hence, on extensive growth. Government tax, spending, and monetary policies promote more and more production and consumption, to grow GDP endlessly. Financial markets drive companies, including Toyota, to play in the same game. But an economy that lives on steroids is no more sustainable than any growth-driven organization operating within it. Until they can escape the curse of endless growth, both the economy and all its members are doomed to collapse and die.

Our Earth and its life-sustaining biosystem, as well as all systems in the entire universe from which Earth emerged, reflect the existence of continuously open fields of possibility. The most fundamental and pervasive process

in the universe, and especially on our Earth, is the constant emergence of newness out of what went before. Nothing ever constrained the flourishing of possibility in that process until humans introduced the idea of quantitative choice to the system. Quantity automatically limits possibility and emergence to outcomes that can be measured. Quantum physicists have suggested that undisturbed systems in the universe naturally stay in multiple states simultaneously, unless someone intervenes with a measurement device. Then all states collapse, except the one being measured. Perhaps what you measure is what you get. More likely, what you measure is *all* you get. What you don't (or can't) measure is lost.

By using quantitative targets to manage results without regard for the effect our actions have on the underlying system from which the results emerge, we close fields of possibility and limit ourselves to what our measures will produce. In effect, that describes existence inside a machine, not life. Life implies flourishing in fields of continuously renewing possibility. Mechanistic existence suggests a repetitive, homogeneous system running down to death, without hope of renewal or new possibility. Our worship of quantity virtually guarantees that the economy we inhabit today and the businesses within it are life-denying, not life-enhancing.

Businesses, like any living systems, should grow to be what they are supposed to be, not more. Ants grow to be ants, elephants grow to be elephants and humans grow to be humans. Each in its context flourishes in life, in being—not in growing, accumulating, or having. Sustainability, as my colleague John Ehrenfeld has said, is the possibility that humans and other life flourish on the Earth forever. Nurturing that possibility is the challenge that companies, citizens, and the communities we inhabit must accept in the name of sustainability. Lean management *in the sense of running companies according to living system principles* is an important first step in meeting this challenge. Then comes the hard part: conducting our economic activities within the limits of Earth's regenerative

processes. To fail at that will make all the lean initiatives irrelevant. But we can succeed, as long as we choose to live according to the principles of living systems and not according to the imperative of quantitative growth. ■

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## For Further Reading

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## NEXT STEPS

Roger Saillant, the retired president and CEO of Plug Power Inc. and current board chair of WorldWide Energy, has the following suggestions for implementing Tom Johnson's "managing by means" framework:

For me, the process always starts with four questions:

- Where do you want to go?
- Where are you now?
- Why do you want to go there?
- How will you get there?

The first two questions get you a description of your current state and your desired state, in several dimensions. For example, you may want to be admired, to have top quality, to provide a good value proposition for customers and an exciting environment for employees—and be profitable. All of this becomes meaningful when you look honestly at where you are; then you start to see how much work you have to do.

Why you want to get there has to do with establishing at least one attribute for the company that is inspirational. If your goal is simply to be the low-cost producer, you won't inspire much passion or commitment. But if you want to be a company that is solving one of the great dilemmas of the world—energy, food, quality of life, health, some form of human benefit—people will be a lot more likely to commit themselves to work and perform at a higher level. It's a much different quality than simply managing the financials. Making money allows you to have a company—but it's not the reason you have one, if you want a great company.

Finally, how will you get there begins a discussion about the nitty-gritty operational details that, as Tom Johnson points out, are treated as an afterthought in many large companies.

—From Roger Saillant's Commentary on "Confronting the Tyranny of Management by Numbers" by H. Thomas Johnson in *Reflections: The SoL Journal on Knowledge, Learning, and Change* (Volume 5, Number 4).