

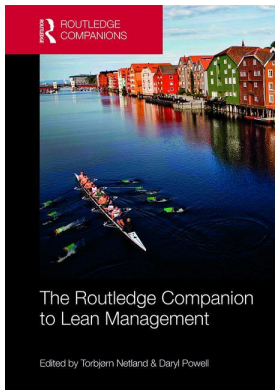
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THE TOYOTA WAY

Striving for Excellence

Jeffrey K. Liker

The Problem? The Misunderstanding of Lean and “How it Applies Here”

Lean (along with its variations, such as Six Sigma, theory of constraints, Lean Six Sigma, and specialties in different industries like agile IT development, lean construction, lean healthcare, lean finance, and lean government) has become a global movement. As with any management movement, there are true believers, resisters, and those who get on the bandwagon but do not care a lot one way or the other. There are a plethora of service providers through universities, consulting firms of various sizes, and not-for profit organizations, and there is a book industry.

For zealots like me, this is, in a sense, a good thing—there are consumers of my message. But there is also a downside. As the message spreads and goes through many people, companies, and cultures, it changes from the original, like the game of telephone in which the message whispered to the first person bears little resemblance to the message the tenth person hears.

In the meantime, well-meaning organizations that want to solve their problems are searching for answers. What is lean? How do we get started? How do these tools developed within Toyota for making cars apply to my organization? How do these methods apply in our culture, which is very different from Japanese culture? Do the tools have to be used exactly as they are in Toyota, or can they be adapted to our circumstances? And how does Toyota reward people for using these tools to improve?

These are all reasonable questions and, unfortunately, there are many consultants and self-appointed “lean experts” ready to answer them, often in very different ways. But the starting point should be the questions themselves. Are these the right questions? As reasonable as they may seem, I believe they are the wrong questions. The underlying assumption in each case is that lean is a mechanistic, tool-based process to be implemented as you would install a new piece of computer software. Specifically, the assumptions can be summarized as follows:

- 1 There is one clear and simple approach to lean that is very different from alternative methodologies.
- 2 There is one clear and best way to get started.
- 3 Toyota is a simple organization that does one thing—makes cars—and it uses a core set of the same tools in the same way, every place.

- 4 The tools are the essence and therefore must be adapted to specific types of processes.
- 5 Because lean was developed in Japan, there may be something peculiar about it that needs to be modified to fit cultures outside Japan.
- 6 Toyota itself has a precise method of applying the tools in the same way in every place that others need to copy.
- 7 The formal reward system is the reason people in Toyota engage in continuous improvement and allocate effort to support the company.

In fact, none of these assumptions are true, and that is the problem. The gap between common views of lean, and the reality of how this powerful thing Toyota has been pursuing for almost one century *actually* works, is preventing organizations from accomplishing their goals. The Toyota Way, by contrast, is a generic philosophy that can apply to any organization, and if applied diligently, will virtually guarantee improvement (Liker, 2004). It is a way of looking at organizations, a philosophy, and a system of interconnected processes and people who are striving to continuously improve how they work and deliver value to customers.

Having dismissed the common and simplistic notion that it is a program of tools for taking waste out of processes, in this chapter I wish to convey the deeper meaning of the Toyota Way. I will briefly describe the origin of the Toyota Way within Toyota, the principles I have distilled, and what it looks like to pursue it in practice.

The Toyoda Family: Generations of Consistent Leadership

To understand a company's culture, we should always begin with its roots—the core values of its founders—and Toyota is no exception. Many companies have drifted so far from their roots that the initial values are barely visible, but Toyota has maintained a remarkable degree of continuity of culture over most of a century, starting with its founder, Sakichi Toyoda.

Sakichi Toyoda: Creating Looms and Values

Sakichi Toyoda was born in 1867, the son of a poor carpenter in a rice village. He learned carpentry from the ground up, and he also learned the necessity of discipline and hard work. A natural inventor, he saw a problem in the community. Women were “working their fingers to the bone” using manual looms to make cloth for the family and for sale, after a full day of work. To ease the burden, he began to invent a new kind of loom. His first modification used gravity to allow weavers to send the shuttle of cotton thread back and forth through the weft by manipulating the foot pedals instead of by using their hands. Immediately, women worked half as hard and were more productive. Sakichi Toyoda continued to make improvement after improvement, some small, some big, and in 1926 formed Toyota Loom Works.

He was a devout Buddhist and always lived strong values. One of his favorite books was called *Self-Help*, by British philanthropist Samuel Smiles ([1859] 1982). Smiles dedicated much of his life to mentoring juvenile delinquents so they could become successful contributors to society. He wrote about the inspiration of great inventors who, contrary to popular opinion, were not always privileged and gifted students, but achieved great things through self-reliance, hard work, and a passion for learning. This fit well the story of Sakichi Toyoda, who raised himself from a poor background as a carpenter's son, and did not appear particularly outstanding, but who through the passion of contributing to others, the hard work of learning the fundamental skills of carpentry, and a clear picture of the problems he wanted to solve, relentlessly made improvement after improvement, each to solve the next problem.

As Sakichi Toyoda grew, his ambitions and contributions also grew. He began to envision a fully automatic loom and each individual innovation moved him nearer to that idea, continually improving toward his vision. He started by helping the women in his family, then the community, then helping to industrialize Japanese society, and ultimately contributing to all society. He is considered by many to be the father of the Japanese industrial revolution and is given the title “King of Inventors” in Japan. Along the way, he cultivated himself and his own values. These values eventually became the guiding principles of Toyota Motor Company, and included: contribute to society, put the customer first and the company second, show respect for all people, know your business from the ground up, get your hands dirty, work hard with discipline, work as a team, build in quality, and continually improve toward a vision.

Built-in quality was most evident in one of his most influential inventions—the loom that could stop itself when there was a problem. Every innovation by Sakichi Toyoda was problem-driven based on what he learned from earlier innovations. After the loom was reasonably automatic and could run at a relatively high speed, he noticed that when a single thread broke on the weft to make cloth, the cloth would be defective. A human had to stand and watch the loom and stop it when that happened, which he considered a tremendous waste of human capability. Yet another invention used gravity. This time, he added a piece of metal onto each thread in the weft. When a thread broke, the metal would interfere with the threads and stop the loom. He called this *jidoka*, a word which was formed by adding to the Chinese kanji for automation a symbol for a human. Thus, he had put human intelligence into automation so the loom could stop itself when there was a problem. He later added to this a small metal flag that would pop up, signaling “I need help.” *Jidoka* would become a pillar of the Toyota Production System, conveying the notion of stopping when there is a quality problem and immediately solving the problem.

Based on the teachings of Sakichi Toyoda, the Toyota Precepts were created, which still guide the company today (Toyota, 2012):

- 1 be contributive to the development and welfare of the country by working together, regardless of position, in faithfully fulfilling your duties;
- 2 be ahead of the times through endless creativity, inquisitiveness, and pursuit of improvement;
- 3 be practical and avoid frivolity;
- 4 be kind and generous; strive to create a warm, homelike atmosphere;
- 5 be reverent, and show gratitude for things great and small in thought and deed.

In 1937 Toyota Motors was formed by Kiichiro Toyoda as a division of Toyota Loom Works. Kiichiro’s father, Sakichi, had asked him to do something to contribute to society and Kiichiro chose automobiles, a highly risky major challenge. Automobile companies are very capital-intensive and it seemed Toyota was a lifetime behind Ford Motor Company, which at the time was pumping out over one million vehicles per year and getting all the attendant economies of scale. Why would a tiny start-up in an obscure part of Japan have any chance of competing, outside perhaps of the protected market in Japan? Like his dad, Kiichiro Toyoda saw a need, an opportunity, and believed in his team. One of the decisions in the start-up of the company was that Kiichiro, a mechanical engineer, and his team would learn about all the technologies from the ground up and get their hands dirty. This reflected the Toyota principle of self-reliance. Another core principle was announced in a speech Kiichiro gave in which he said: “I plan to cut down on the slack time in our work processes . . . As the basic principle in realizing this, I will uphold the ‘just in time’ approach.”

What was this “just in time” approach? Operations management courses in MBA programs would not teach JIT for decades and there were no books or articles about it. It seems he

made it up! And he was not exactly sure what it was. Taiichi Ohno, a brilliant young manager in Toyota Automatic Loom Works, was given the assignment to develop the manufacturing system that would become the next great innovation in Toyota beyond automatic looms—the Toyota Production System (TPS).

The methodology for Ohno’s innovation was the same as Sakichi Toyoda’s for the loom—relentless *kaizen*. *Kaizen* literally means “change for the better,” but in Toyota’s case it means systematically working toward a challenge overcoming obstacle after obstacle one at a time. When Ohno started, he was running the machine shop for engine and transmission components and just started trying things—small experiments—to solve problem after problem. Nothing was worth talking about for Ohno until he actually tried it on the shop floor. Like Sakichi Toyoda, the more problems he solved, the more problems were revealed.

For example, the factory was organized in the traditional way by type of process—lathes over here, drilling machines over there—and there were specialist workers for each machining department. Ohno’s idea was to create a cell for a product family and have all the machines set up in sequence to make complete parts. He wanted the cells to build to *takt*—the rate of customer demand—with no inventory in the cell except one part here or there as a buffer between machines. He also wanted the flexibility to adjust the number of people in the cells based on the rise and fall of customer demand without losing productivity. This meant that as demand went down, there would be fewer people and some would have to operate more than one type of equipment, such as a lathe and a drill.

The concept of a cell building to *takt* was a magnificent idea, but proved to be much harder to implement than Ohno expected. Lathe operators did not want to operate drilling machines and vice versa. His solution? Go to the *gemba* (where the work is done) every day and spend time with the workers showing them, and getting them to try the new system. Over time, they found it was a better way to work as it produced higher quality with less wasted effort, and was even safer. Ohno learned a critical lesson—simply thinking of an idea is only the start and the real work is the time-consuming process of training and developing people through repeated practice so the new system becomes “the way we work.”

Much later, after the bugs had been mostly worked out, the system was put into writing, and represented as a house (see Figure 2.1). The term “system” is not incidental, but very intentional. The two key pillars were Kiichiro Toyoda’s just-in-time and Sakichi Toyoda’s *jidoka* (built-in quality). If Toyota was going to work with very little inventory and build in quality at every step, the foundation had to be extremely stable. There had to be reliable parts delivery, equipment that worked as it was supposed to, well-trained team members, and essentially no deviations from the standard. Ideally, the foundation would provide the ability to build consistently to a leveled production schedule, without huge ups and downs, supporting the customer *takt*. Leveled production would provide a steady rhythm for the factory.

To maintain this high level of stability, quality, and just-in-time production would require intelligent team members who were vigilant in noticing all the many problems that occurred every day and who took the time to think about and test countermeasures to address deviations from the standard as they occurred. At the center of the house are highly developed and motivated people who are continually observing, analyzing, and improving the processes. These individuals are focused on the purpose, and on correcting any deviations from the standard that adversely affect the purpose. The process gets closer to perfection through continuous improvement by thinking people; therefore, some in Toyota have described TPS as the *Thinking* Production System.

The purpose of the system is represented by the roof—best quality, lowest cost, on-time delivery, in a safe work environment with high morale. The house was a type of system—weak pillars, unstable foundations, a leaky roof, and the house will come tumbling down. Perfect

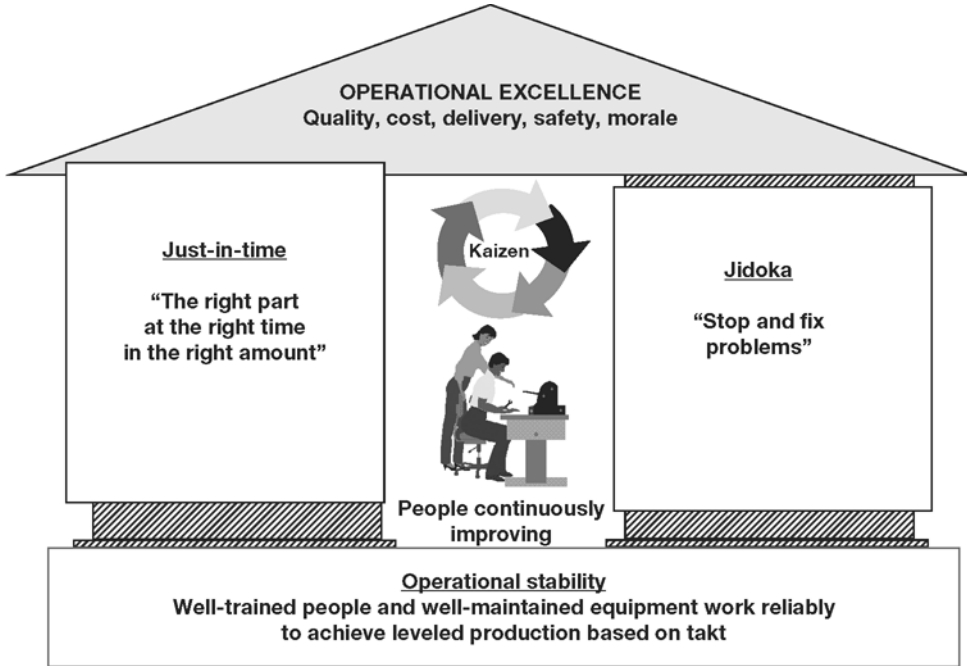


Figure 2.1 The Toyota Production System house

Source: Liker (2015).

adherence to the TPS vision was never possible, but it provided a picture of perfection that could always be striven for—the purpose of kaizen.

What is Lean?

It is very difficult to define “lean,” but let’s start with the term’s origin as a descriptor of organizational excellence. It is not a term you will hear a lot around Toyota. It was first introduced in 1990 in the book *The Machine that Changed the World* (Womack et al., 1990), which was the result of a five-year study at the Massachusetts Institute of Technology (MIT) comparing the American, European, and Japanese auto industries. The researchers consistently found, regardless of the process or metric, that the Japanese automotive companies were far superior to the European and American companies in a wide range of areas, including manufacturing efficiency, product quality, logistics, supplier relationships, product development lead time and efficiency, distribution systems, and more.

The message was that the Japanese had developed an integrated enterprise based on a fundamentally different way of looking at the company, work processes, and people that can be best viewed as a new *paradigm* of management. The word “lean” was suggested by then graduate student John Krafcik (1988), who argued that lean means doing more with less, like a superior athlete, and that the Japanese, especially Toyota, were doing more of everything they needed to do for the customer with less of almost everything. It was a holistic concept for the enterprise, not a toolkit for a specific type of process. It applied both to routine work, such as is done on the assembly line, and to very non-routine work requiring specialized knowledge, like engineering design and sales.

The concept of “waste” in lean is central but often misunderstood. Waste is more than specific actions or objects that need to be eliminated. Waste is anything that causes a deviation from the perfect process. The perfect process gives the customer exactly what they want, in the amount they want, when they want it, and all steps that deliver value do so without interruption.

The concept of “one-piece flow” is the ideal. Each step in the value-adding process does what it is supposed to do perfectly without the various forms of waste that cause processes to be disconnected by time, space, or inventory. Toyota often uses the metaphor of a free-flowing stream of water without stagnant pools. Of course, one-piece flow requires perfection in everything that is done by people or technology and is therefore an impossible dream. Toyota says this is their “true north” vision which is not achievable, yet always the goal—striving for perfection while recognizing there is no perfect process.

I submit that any organization should desire this state of perfection, regardless of the specific product, service, or culture of the organization. The organization that can deliver pure value to its customers without waste, while continuously innovating to improve the product, service, and processes, will be successful. This ideal, or some would say *idealistic*, vision arose in Toyota from some very special people, starting with the great inventor Sakichi Toyoda.

Womack and Jones (1996) then built on *The Machine that Changed the World* with the book *Lean Thinking*. Lean was even more than a highly effective system for delivering value to customers—it was a different way of thinking about the total enterprise. They made clear in that book that the lean model was not based on Japanese automotive companies in general, but on Toyota specifically. Toyota had the best performance at the time of any of the Japanese auto companies and was the best model for “lean thinking.”

The Toyota Way: A Philosophy and Way of Thinking

The Toyota Way begins with a passion for solving problems for customers and society. To do this requires deep respect for people and their ability to adapt and innovate. Building an enterprise that can withstand being beaten and battered by the harsh environment, decade after decade, requires a degree of adaptation that can only come from relentless kaizen from everyone possible. Since people are not born with the spirit or skills for kaizen, they must be taught them. As with any other advanced skill, teaching requires some direction and persistent practice.

If you believe findings by cognitive psychologists, such as Dr. K. Anders Ericsson, mastering any complex skill requires “deliberate practice” for 10 years or 10,000 repetitions (see Ericsson et al., 2007). Deliberate practice requires a self-awareness of weaknesses and drills to correct them, one by one, and is helped by a teacher who can see the weaknesses and suggest the drills. Ohno had been doing this throughout his career. As he learned, he then taught, not through lecturing, but at the gemba by challenging students, giving them (often harsh) feedback, and letting them struggle.

After the TPS was well established in Japan, Toyota had a dilemma. Could this finely tuned system work in a foreign country, without the Japanese workers and culture that seemed to fit so well with its principles? Toyota did what Toyota does—experimented. They decided not to go it alone and partnered with General Motors in a 50–50 joint venture called New United Motor Manufacturing Inc. (NUMMI). NUMMI started up in 1984 hiring back over 80 percent of the workers from the GM plant in Fremont, California that had been closed down in 1982. A reason for closing down the plant was horrible labor relations that led to low productivity and quality. With these workers and the Toyota Way, NUMMI quickly became the best automotive assembly plant in North America in quality, productivity, low inventory, safety—in short, more like a high-performing Toyota plant in Japan than a low-performing GM plant. Toyota learned a

lot and then decided to start up its own plant in Georgetown, Kentucky (TMMK) which started production in 1988.

Fujio Cho was selected as the first President of TMMK. If anything it had surpassed the performance of NUMMI and all seemed well. But Fujio Cho saw a weakness. As the Japanese trainers left and Americans were increasingly taking over responsibility for the plant they needed explicit training in the Toyota Way. He realized there was more to Toyota's company philosophy than is captured in the TPS, which is mainly a prescription for manufacturing. The broader philosophy was learned tacitly in Japan, by living in the company and repeatedly hearing the stories and being mentored. What he experienced in America was a lot of variation in the understanding of the core philosophy which Toyota expected all of its leaders to embrace.

Fujio Cho's work over a period of about 10 years led to many versions of a document that never got approved. Toyota works toward consensus, and it could not get consensus. When Fujio Cho became President of Toyota Motor Company globally in 1999, he revived the effort, this time for the company as a whole. He still struggled to get consensus because others said the philosophy was a living and breathing entity and could not be frozen in time as a document. He finally got agreement to call the document "The Toyota Way 2001," with the understanding that it was the best they had in 2001 and could be modified in the future (it has not been so far).

It is represented as a house (see Figure 2.2). The two pillars are continuous improvement and respect for people. Continuous improvement means just what it says: everybody, everywhere, constantly challenging the way they are currently working and asking, "Is there a better way?"

Respect for people goes far beyond treating people nicely. In Toyota, respect means challenging people to be their best, and that means they are also continually improving themselves as they improve the way they work to better satisfy the customer. Respect for people is intentionally generic. It is not only respect for people who are employed by Toyota. It starts with the purpose of the company, which is to add value to customers and society by providing the best means of transportation possible. Respect for society includes respect for the environment, respect for the communities in which Toyota does business, and respect for the local laws and customs of each community.

It is difficult to respect people who are treated as temporary, disposable labor. So Toyota makes a long-term commitment to its employees and to the communities where it sets up shop. Though it does happen, people rarely lose their jobs. Even in the Great Recession, Toyota carried tens of



Figure 2.2 The Toyota Way 2001 house

Source: Liker (2015).

thousands of people globally who they did not need to make vehicles at the low level of demand (see Liker and Ogden, 2011). They worked on continuous improvement and on developing people through education and training, waiting out the bad economy and preparing for the inevitable pent-up demand when things got better. Toyota did not close factories, and this saved local communities from the devastating effects of massive job loss.

There is a particular right way to achieve continuous improvement and respect for people represented by the core values in the foundation of the house. It begins with developing people who will gladly take on a challenge, even when they have no idea how they will achieve it. Examples of challenges that Toyota has achieved from 2000 to 2016 include:

- 20 percent reduction in resources for new model development;
- 25 percent improvement in fuel economy with 15 percent more power;
- 40 percent reduction in cost of a new plant;
- 50 percent reduction in launching a new model, with almost zero downtime;
- eventual target of 75 percent reduction in part numbers.

Each of these remarkable achievements was the result of relentless kaizen. Someone got the assignment to achieve a breakthrough objective, they got a team together, and they followed a well-defined process to systematically improve, step by step, toward the challenge. The challenge provided the direction. Toyota Business Practices (TBP) provides the process (see Figure 2.3). Those familiar with improvement processes will recognize the plan-do-check-act (PDCA) cycle, which is often attributed to Dr. W. Edwards Deming. It is through many cycles of PDCA, essentially constant experimentation and study reflecting on what was learned at each step, that Toyota achieves its breakthrough objectives. And as the leaders work through obstacle after obstacle to meet the challenge, they develop as better leaders and people.

	Concrete actions	Drive and dedication (values)
P L A N	Define the problem relative to the ideal. Break down the problem into manageable pieces. Identify the root cause for each piece. Set targets for improvement. Select the appropriate countermeasure among several alternatives.	Customers first. Always confirm the purpose of your work. Ownership and responsibility.
D O	See countermeasures through.	Visualization of process. Judgment based on facts.
C H E C K	Check both results and processes.	Think and act persistently. Follow each process with sincerity and commitment.
A C T	Adjust, standardize, and spread.	Thorough communication. Involve all stakeholders.

Figure 2.3 Toyota Business Practices—Toyota’s systematic improvement process

One hard-and-fast rule of TBP is to practice it at the gemba, or what Toyota calls *genchi genbutsu*, meaning, “go and see the actual place to observe directly and learn.” Toyota leaders are obsessive about direct observation. In fact, they distinguish between data (abstractions of reality) and facts (direct observation of reality). Both are invaluable in understanding the current reality and determining what happens when you attempt some sort of intervention.

The final two values focus on people. People work to be the best contributors possible to the team. As stated in “The Toyota Way 2001,” “We stimulate personal and professional growth, share the opportunities of development, and maximize individual and team performance” (Liker, 2004). The team is always given credit for accomplishments, while there is always an individual leader accountable for the results of the project.

Then we come right back to respect as the way in which improvement is carried out. This includes respect for stakeholders, mutual trust and responsibility, and sincere accountability. Accountability is described in the following way: “We accept responsibility for working independently, putting forth honest effort to the best of our abilities and always honoring our performance promises” (Liker, 2004).

What happened to the TPS, you ask? What about just-in-time (JIT) and built-in-quality and stable processes? In “The Toyota Way 2001,” these are part of “lean systems and structure” which contributes to kaizen (see Figure 2.4). These are the tools and concepts which we should consider when working to meet the challenging objectives. At the start of this chapter, I argued that lean management has lost perspective. It almost seems to be an end unto itself. Companies think, “Let’s implement JIT to reduce inventory” or “Let’s install quality systems to build in quality” or “Let’s put in standard work so that processes are stable.” In the Toyota Way, however, these are but tools and concepts to consider when doing kaizen to strive toward excellence. The focus is on the objective and the right way to achieve the objective. Lean systems are side by side with innovative thinking and promoting organizational learning, and collectively, these contribute to kaizen. This is an entirely different mindset than the mechanistic view of implementing tools to get specific results.



Figure 2.4 Lean systems are a contributor to kaizen in the foundation of the Toyota Way

Applying the Thinking of the Toyota Way to your Organization

As we reflect on the beginning of the chapter, when we discussed the problem of companies and their many advisors viewing lean as a toolkit for waste reduction, perhaps it is clearer just how far afield these mechanistic “lean programs” have come from the rich tradition developed within Toyota. I hope the chapters in this book help put our readers back on track to the original purpose of the Toyota Way: to create a culture of people continuously improving to adapt and grow through the many challenges of the environment.

This is not to say that anywhere you go and anyone you meet in Toyota follows all of these principles to the letter. Think of “The Toyota Way 2001” as a holy document like the Bible or a governmental constitution. The fact that people deviate from the doctrine, or misapply it, is not an indictment of the doctrine. It is simply that we as humans are far from perfect, sometimes misinformed, sometimes using bad judgment, rarely being perfectly disciplined, and often giving in to immediate needs and desires. In fact, if we were perfect, we would not need any written or spoken doctrine. We would just be.

The Toyota Way is often spoken about as “true north,” a beacon that guides daily behavior and helps us to detect whether we are on track or off track. The very basis of continuous improvement is to identify gaps between the actual and ideal and work relentlessly to reduce those gaps, including gaps in our own skills and behaviors.

If we think about trying to improve our bodies physically through exercise and healthy eating, we would all admit that we err from time to time—eating too much or skipping exercise. The vision is a great one, but the execution is often flawed. For those who have lost control of their bodies and are obese, it is extremely difficult to even get started. We have so far to go and need tremendous discipline and a great deal of social support. Those in relatively good shape may already have some of the skills and may have developed a degree of willpower. And the more we exercise that willpower to create positive habits, the easier it becomes to follow our daily regime.

Being mediocre as an organization with few well-defined habits and poorly defined processes is like being obese. It is painful to even think of getting started on the path to true north. But as we try, sometimes fail, but also have small wins, we get more and more skilled in overcoming our weaknesses. Success breeds success and diligent practice is the only true path to excellence.

Toyota is far from perfect, but is comparatively healthy in many parts of the organization and in many different cultures. It has passionately developed leaders who strive to live the values—striving for true north. They have the social support of senior leaders consistent in their vision of true north—consistent over decades of growth. Even for an organization very far from Toyota’s maturity level, it is never too early to start the process of looking with brutal honesty at where you are and where you would like to get to—your true north. Then we need to take a first step, then a second step, and continuously improve our way to the vision.

As you think of how to get started in your organization, review the principles of the Toyota Way. Review Toyota Business Practices, which gives you an idea for getting started. Where will you start? Identify a challenge that will bring your organization to a new level of customer service. Define the ideal state. Understand the current state. Then break down the problem into manageable pieces—step by step. For each step, identify a short-term target and begin to experiment toward each target through PDCA cycles. Every step is worthwhile, successful or not, as long as you learn something. Additional guidance is provided by Mike Rother (2010) in his book *Toyota Kata*. He has gone deeper into the essence of Toyota thinking, providing practice routines to work your way toward the habit of daily improvement.

If you already have a lean program started, I encourage you to think about that program as part of the current state and compare it with the ideal state. What are the critical gaps in how the

program is being executed? How are you doing at developing people in a respectful way? Where is a culture of continuous improvement starting to take root and where is there stagnation? Investigate personally at the gembu. You will begin to understand the true condition of your organization and yourself as a leader. Striving for perfection always begins with working on yourself as a role model for continuous improvement and respect for people.

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