Ohno's Method

Creating a survival work culture.

Jinichiro Nakane and Robert W. Hall

The legacy of the late Taiichi Ohno, father of the Toyota Production System (TPS), is much larger than the system's techniques, none of which he is known to have invented himself. During the formative period of TPS, roughly 1945-1965, as Toyota fought to survive, Ohno's leadership instituted a new way of thinking and a new work culture. In time it filled all of Toyota, and eventually other companies, becoming a culture of excellence, motivated by more than the traditional business goals of growth and profitability. At its core it remains a survival culture.

Many organizations now emulate TPS by borrowing some of the techniques and slightly modifying their culture. Most explanations of TPS, underplay the work culture. However, our Japanese study group, JAPICS, found that all the top practitioners of a TPS-like system had a similar culture, one traceable to Ohno, and that the culture-building side of TPS is applicable to any kind of business.

TPS was developed while Toyota was in survival mode, so people had to pull together. All the techniques promoted the ability of working personnel to execute kaizen. A working culture centered on kaizen is not cleanly separable from the techniques.

The TPS working culture invests full faith and confidence in people doing direct work. It stimulates them to develop their capabilities to the fullest and make maximum use of their talent. If leaders merely "implement techniques" without fully developing people, their system has no heart.

While all lean system techniques are designed to eliminate waste, they are also intended to develop direct action people to function autonomously, both running processes and improving them. That's the real revolution. Pursued vigorously, conversion to any system like TPS is a life changing experience extending far beyond shop floors.

Aside from manufacturing, in any industry many of the issues that stymie system integration, supplier relations, product design, and so on arise because the human work culture to do this has not developed. Ohno pioneered such a culture.

Ohno's Method

Through mentoring, Taiichi Ohno developed other people by challenging them with provocative questions, stimulating them to improve processes on their own, and then learning to self-manage them. His leadership approach is called Ohno's Method.

To this day, Ohno's original students refer to "Ohno's Method" of developing people to their fullest. Ohno began developing his method around 1945, during TPS's formative years, and he continued to refine it until his death. Ohno was a mentor coaching his "students" to become mentors in turn. Most of Toyota's TPS leaders can trace their own TPS mentor in a line

back to Ohno.

Undistinguished as a speaker and reluctant as an author, Taiichi Ohno was a doer's coach, not a consultant, professor, or public advocate, and certainly not a conventional manager. When young, he was never comfortable in an office, preferring to be close to the action, in touch with reality. (Every "factory rat" in the world can relate to this.) As he matured, he became a mentor to Toyota's TPS leaders one on one, or in small groups, sending them out to see reality, understand it thoroughly, and in turn to develop supervisors and working people to improve the processes around them themselves. All of Ohno's students remember thinking that they had mastered TPS only to have another penetrating question send them out to learn more.

Kaizen, the core technique of TPS, begins with behavior. Observe carefully to see the facts of a situation. Make maximum use of everyone's brainpower to devise simple, ingenious solutions to problems. TPS culture is this approach to grass roots kaizen, which Ohno promoted in many ways.

Standing in the Circle

Ohno coached his budding TPS leaders to carefully observe reality by drawing a chalk circle on the floor, telling them to stand in it for several hours observing reality, mind wiped clean, undistracted by things seemingly more important to do. This practice in intensive observation imbued them in kaizen thinking, which was necessary before they could coach others.

Kaizen is the core of TPS. All other techniques promote kaizen by maximizing the number of opportunities to practice it. Kaizen is learned primarily by doing; classes merely familiarize people with techniques.

Developing a few experts helps a little, but the power of kaizen is multiplied many times if the experts coach everyone else to see and solve problems. Reality is that no one becomes an expert with magic answers. The power is in the method.

Process visibility, seeing reality, is the primary way to see process problems and to identify kaizen opportunities. Ohno cared not a whit for reports or models. To improve visibility, his students developed methods such as 5S and Kanban.

Unfortunately, when introduced in the West, 5S was often called "housekeeping." However, cleanliness and orderliness are only sub-goals. The main purpose of 5S is to promote process visibility, that is, to make kaizen opportunities instantly obvious.

Kanban too is often understood as only a production control system, or an inventory limit, but its main purpose is also process visibility. The intent would be clearer if these techniques were labeled Instant Problem Visibility methods (IPV if you like acronyms).

Process visibility reveals problems to anyone, not just managers. When something is amiss, workers can quickly determine the cause and take action. Process visibility also stimulates everyone to think of still more ways to improve it. Thus empowered by the method, workers learn to self-manage processes and spontaneously improve them.

Visibility — thoughtful visibility — is a tenet of TPS. Empty-headed gawking is insufficient. Ohno's basic problem solving method was "to ask why at least five times," which means that he didn't ask people to literally confine themselves to the circle, but to dig through the clutter to see the essential problem.

Very small processes, like integrated circuit production, cannot be seen directly, so they are made largely through data and remote control. But even with fully-gowned workers and minute processes, process visibility reveals a remarkable amount of waste.

Large dispersed processes cannot be seen all at once. When flow charting (or Value Stream Mapping) a large process, people must communicate precisely, or someone must travel around to see reality. Staying in touch with reality is the important part. The only way to be sure that a chart is up to date is to review the process frequently. In large processes, like automotive engineering change systems, someone is likely to be tinkering all the time, so that at any instant, no one knows how it really works.

Reality is that no one becomes an expert with magic answers. The power is in the method.

"Standing in a circle" is taking the time to understand reality before acting.

The stand-in-a-circle exercise is good anywhere, for example, when studying customers' evaluation and use of a product. It works on docks, in offices, and everywhere else.

Merely installing visibility tools doesn't accomplish their purpose, staying connected with reality and remaining curious—always asking why and identifying problems. That takes constant practice. Although careful observation can be cultivated into a habit, it is never simple. Toyota veterans know that when observing a process for the first time, it takes several hours — sometimes days — to develop an initial grasp of it. (Seeing nothing happen in many hours may be a marvelous discovery, not a waste of time.)

"Standing in a circle" is taking the time to understand reality before acting. It is not creating some kind of model, in software or otherwise, and seeing if it works. It also counters the instinct of managers (and others) with so strong a bias for action that they always want to be making something happen — even if it is wrong.

A popular story is that Ohno made top executives stand in a circle too, but no one remembers an instance when he actually did this. People relish the thought of an executive, jerked from a cloistered existence, forced to see how things really work. Ohno primarily "confined" his student TPS leaders to the circle, teaching them how to understand deeply before acting, and how to teach others to do the same. Constant practice observing reality became a core value of the new culture.

Standard Work and Work Descriptions

Soon after beginning work at Toyota, one of Ohno's first jobs was writing work descriptions, forcing him to organize and codify what he saw. He personally found this so beneficial that he thought that workers should write their own work instructions. Only they, not he, were in position to constantly comprehend the details of work in their areas. If a staff person wrote instructions for them, they missed the opportunity to think through the whys and wherefores of their tasks for themselves, and might not actually follow the instructions.

In time, Ohno saw that thinking about work was the first stage of workers undertaking kaizen. Standard work is the outcome of kaizen. Work instructions merely document it. (See the box copy on the next page.) At a minimum, Toyota workers revise or improve work whenever the schedule changes takt time. Thus "kaizen" ceases to be episodic, done only if a process looks sick, and becomes a routine discipline. Done in teams, it also the key to process visibility.

Today workers and team leaders at Toyota jointly develop "standard work." Since much work is done by teamwork across shifts, both kaizen and its documentation must be coordinated, lest individuals merely improve their own tasks at the expense of others. The development and documentation of standard work opens workers' eyes to processes around them. Of course, deviations from standard work in use signal a process problem somewhere. But behaviorally, visibility is learning to expose processes and problems, and learning to share kaizen discoveries—best methods—freely.

Rarely are problem exposure and methods sharing instinctive. A culture to do this must be developed by coaching and example.

Unfortunately, standard work in this sense is easily confused with a Taylorist work standard, or computerized task menus. To most managers, the idea that workers should regularly improve their own processes, documented by work instructions, has been unthinkable. No brief label suggests it. Clearer names, such as "Distributed Production Planning" or "PDCA in Daily Work" have been proposed, but they never caught on.

Work instructions should be quickly interpretable by experienced workers, who are, after all, the primary customers of this effort. Real work instructions written by the doers are seldom showpieces, and seldom lengthy. They are not paperwork to impress inspectors.

In very few Western companies, not

"*Standard Work," Kaizen, and Work Instructions*

Each time a schedule changes the mix of work or its timing, all workers and team leaders rethink their tasks, improve them, and adapt them to the new conditions. Process improvement ideas that materialize at other times may be implemented immediately, or bunched together and implemented at a schedule change.

Workers and team leaders identify and overcome their work problems using PDCA: Plan, Do, Check, Act. This derivative of the scientific method promotes kaizen based on facts, so the effort does not degenerate because people argue contrary opinions. Writing the work instructions and holding to the methods they represent is the final "Act" stage of PDCA improvement.

"Standard Work" refers to this entire process of routine grass roots kaizen. Once in operation, deviations from standard work add greatly to process visibility — little light bulbs shining on problems for faster, tighter feedback. All TPS leaders agree that standard work is the most time-consuming stage developing a new work culture.

Experienced workers don't need detailed instructions. Procedures common to a plant or department will be understood and codified elsewhere. No form for recording work instructions is universal, but workers in a plant or location may use a similar format.

Items to consider for regular workplace kaizen are shown below. Ohno himself originally listed the top three as minimal requirements. [1]

Cycle time (of the work, not the takt time developed from a schedule)
Work sequence (of the elements of work)
Standard inventory (parts, tools, or materials at only that location; kanban quantities are between stations)
Quality
Layout
Safety and ergonomics
Environment

even "lean ones," do workers fully engage in standard work. If they do, it's a sporadic exercise as part of a kaizen event, for example, not a regular activity.

"Standard work" represents the best process the teams can muster at the time. As with any other skill, kaizen becomes rusty if not used. Staying sharp is considered so important that occasionally a plant changes its takt times just to give the workers practice. Then if the organization suddenly has to change work level or work patterns, people can respond easily.

Regular kaizen practice — standard work — makes Toyota factories more flexible than almost any other auto plants in the world. Elements of work are rethought and shuffled among stations and people until a new product mix and takt time can be efficiently handled. Sometimes cell layouts change within an hour or less. Once workers have attained this capability, an assembly plant can handle multiple vehicle platforms on one line, for instance. That's rare in other assembly plants.

In an understatement, Ohno noted, "For a worker to write a worksheet that other workers can understand, he or she must be convinced of its importance."[2] He might have added that until staff and management are convinced that doers of work should perform their own kaizen and docu-

ment it with their own work instructions, few workers will be convinced. But when standard work takes hold, it narrows the status gap between staff, management, and workers. Perhaps that is one reason why it is hard for staff and management to get out of their box and see it.

Improve It Yourself

In the early days of TPS, Toyota's production volumes were only a few thousand per month. Cash flow was anemic; capital spending almost nil. Short of almost everything except people power, the Toyotas wanted to make vehicles in small volumes at costs that could compete with mass production, spending as little as one tenth the capital per unit as the major mass producers. To survive, they wanted the breakeven volume of a plant to be as low as 30 percent of capacity. When orders were slow, the company could survive. If they picked up, the cash was sorely needed.

Over the years, Toyota's volumes grew so much that they were tempted many times to invest big capital based on large volume projections. However, Toyota's system continues to promulgate capital avoidance, epitomized by do-it-yourself improvement.

After the war, workers came from all over Japan. Many were young, not long out of high school, their impressions of how work should be done not yet fixed. The older workers had become multi-skilled to cope with product variations in low volumes. For example, during the Korean War, Toyota was saved by suddenly taking on a contract for American military trucks. The workers had a "can do" spirit, but all was not well.

Sparked by a layoff, in 1952 Toyota incurred a strike, the first and last in its history, and shocking to Toyota management, which had an epiphany. From that time onward, they have regarded workers as "real people," not as commodity labor. Ohno followed up by teaching them how to close the gap between managers and workers in everyday work.

From the hiring decision onward, assuming that workers are commodities creates animosity, and sometimes unions. The commodity tradition is preserved by so many common practices, for example, labeling people as "direct labor," that managers may be oblivious to the many ways they assume that workers have innate limitations.

Changing this attitude begins by realizing that only the workers know the details of how work around them is really done, so enlist their full capabilities. Ohno's TPS leaders coached supervisors who in turn coached the workers in the fight against waste. The workers responded. They learned to rebuild and modify tooling and equipment themselves. A few learned to build machines of their own design, often from scrap material. TPS allowed them to see waste, and gave them a purpose for exercising their ingenuity. They became autonomous thinkers, not slaves serving their machines.

Workers' projects generally require minimal investment. Staff personnel have the technology and budget for major projects, but workers' apparatus is simple and low-cost. The culture of do-it-yourself became the primary capital avoidance element of TPS.

One achievement of this tradition remained in operation for many years, Kamigo Engine Plant, first organized into a one-piece flow in 1956 using old equipment modified and enhanced by the workforce. For the next 35 years or so, equipment written off years earlier was rebuilt, improved, and tweaked. About 160 or fewer people built 1500 four-cylinder engines per day with rarely a defect. Nobody beat that performance, and Kamigo became a shrine to simple, do-it-yourself, failsafe methods. Today, the Kamigo Plant has shifted to more modern technology, but kaizen and do-it-yourself standard work cycles continue to tune up the machines and the flow between them.

To promote regular kaizen, Toyota production processes are broken into modules so that improvements within one module don't disturb the others. For example, the Kyushu Assembly Plant breaks a line into ten modules. One group can experi-

ment while others observe. As Ohno put it, "Innovation begins on one foothill of a big mountain."

Since teamwork is important, do-it-yourself is somewhat misleading. The working rule within Toyota is never to change a process by surprise. Try ideas on cool heads first. If co-workers, people upstream and downstream, and those on other shifts agree that you have a hot idea, hop to it and make the change.

Do-it-yourself uncorks a major bottleneck in completing small improvements. If the realization of worker-initiated process improvement depends on others, they may be busy or unenthused. Management can stimulate support personnel to give high priority to worker projects, but nothing beats having people do it themselves whenever they can. That way, little things that refine a process are promptly tended. Because these little things add up to something big, do-it-yourself remains Toyota's modus operandi.

Leadership Based on Ohno's Method

Ohno's profound innovations in leadership are contrary to normal management instinct, and at odds with most of the management conventions of the 20th century, whether occurring to managers naturally, or as propounded by business schools. That's why a TPS-like system is difficult to create, and once created, difficult to sustain.

Japanese ethnicity played a very small part in developing the TPS work culture. Many Japanese managers have no more instinct for it than Western ones. Anywhere on earth, a culture of excellence has to be cultivated by constant leadership that stimulates all people to expand what they see and what they can do, and to collaborate while doing it.

TPS techniques and TPS culture are thought to have spread quickly in the early years primarily because Toyota's factories and suppliers were concentrated in Aichi Prefecture, near Nagoya, in closer proximity than any auto company before or since. Face-to-face communication between Toyota locations and between suppliers was easy.

With or without a union, most companies have a cultural divide between workers, staff, and management. When lean manufacturing is introduced, workers fear for their jobs. Once confident on this point, they need to become enthusiastic learning to improve processes themselves. If they sense that management is uncommitted, or that it bottlenecks improvement, zeal fades. The plant stagnates at C-Class.[3]

TPS culture is the development of all people to use all their capabilities. First-hand workers are familiar with the details — and the reality — of processes around them better than anyone far removed. Well coached, they learn how to collaboratively adapt and improve them to meet the real challenges of the company. Using Ohno's Method, leadership is constantly developing people and leading them in a common direction.

Ohno's method, using a cascade of mentor-coaches, appears to be the most successful way to create this culture. Champions mentor leaders who mentor supervisors who coach the first line workers — in any area, not just production. To deeply understand their processes and to personally experience the exhilaration of kaizen, workers must be more than empowered. They must be enthused about process improvement. Not all burst with pride doing kaizen, but if a critical mass does, the culture will take hold.

If the cultural change stagnates, so do the benefits of TPS. Ideally, people think as they work, and think often about improving their work. Of course, no one can do that constantly, but a TPS culture is a thinking culture.

The benefits are staggering, but hard to measure. One of the big ones is operational flexibility, or agility making changes with minimum waste. Another biggie is closing the gaps between management, staff, and doers. A decade ago, Toyota fumbled a bit when it regarded TPS objectives to be only efficiency (cost), quality, and on-time delivery. Then it rediscovered that concentrating on flexibility and gap closure

is better. Capital expenditure is avoided. Market responsiveness becomes a bigger competitive advantage.

Constant, aggressive improvement for high flexibility, high quality, and high efficiency isn't done in a work culture with big status gaps among managers, staff, and workers. Only when everyone is considered to be a responsible member of the company (and expected to be responsible) can they be coached to think, do, and learn, extending themselves far beyond skill performing a limited set of tasks.

Ohno's Method of Leadership

The Method (Very much like Plan-Do-Check-Act)

1. Mentally force yourself into tight spots (something like a gun to the head concentrates the mind).
2. Think hard; systematically observe reality.
3. Generate ideas; find and implement wise, ingenious, low-cost solutions.
4. Derive personal pleasure from accomplishing kaizen.
5 Develop all peoples' capabilities to accomplish steps 1-4. Everyone learns kaizen by doing it. Managers and staff learn to support workers, proposing only big-step improvements. They learn not to control self-functioning workers.

Human-Based Description of TPS with Ohno's Method

Problem Visibility
↓
Kaizen Problems
↓
Look carefully; think hard
↓
Minimize all waste
↓
Gain satisfaction by overall improvements
↓
Develop everyone's capabilities (mentor them)
↓
Develop flexibility (ability to quickly and easily respond to changes)
↓
Long-term survival

Development, Not Control

At the heart of the conflict between TPS and orthodoxy is the managerial urge to control. By business tradition, managers make decisions and give orders, and staff exercises detailed indirect control, using budgets, cost systems, schedules, work standards, SOPs, menus, job descriptions, and of course, a hierarchical organization. Controls provide "accountability" — called "bureaucracy" when sign-off restrictions become onerous.

The conflict runs deep. Both in economic theory and by law, managers are the agents of owners, controlling the business for them. If we have a serious problem with a company, we expect to talk with top officials, presuming that they exercise control. But in a TPS work culture leadership is development of people. It's not directing the deployment of the ownership's "assets."

This form of leadership minimizes conventional controls, putting full confidence in the development of people, and clearly articulating a strategic direction that everyone can understand — something more tangible than being the best or making a record profit. Only with clarity of purpose and unity of spirit will people work together enthusiastically, regularly going the extra mile.

Second, when leaders inspire and develop the full workforce, they also break down status barriers and break up bureaucracy. Then the staff fears for their jobs, or they simply don't know how to function as advisors and coaches rather than as exercisers of control. Staff and managers need as much development as workers.

Toyota really has two organizations, a formal one to handle the business, and an informal one that self-organizes for process improvement and problem solving without regard for company rank. Anyone can form a group to study or make an improvement.

Ohno's Method assumes that a company is first and foremost its people, in opposition to the usual assumption that a company is a mechanism, needing capital, generating cost, and attracting revenue. In a money-making machine controlled by

management, workers merely operate systems or machines, staff people — thinkers presumed higher in status — design or program machines (and systems). Ohno's Method assumes that machines and systems should serve the people, their masters, not the other way around.

By itself, grass roots kaizen is far from enough to be competitive. New markets, new technology, new types of equipment, and new product lines are from the staff. But their "Big Step" innovations go much more smoothly when refined and sustained by small-step, grass roots standard work.

By personally learning to see reality, and to refine processes by do-it-yourself kaizen, "professionals" ground all other company programs in reality too. Product and process designers better grasp process realities. Intelligent software packages and other models don't fully substitute for this. They depend on data that has to be updated too, just like process flow charts. Grounding in reality does much to prevent major projects from being unrealistic, or as Toyota managers phrase it, "No big gap between plan and action."

Ohno's Method leads to organizing around people and process flows, or around problem seeing and problem solving, rather than for control. Support people stay as close to the direct action as they can. By that thinking internal processes are organized so that they link suppliers to customers as directly as possible. Small and simple is beautiful. The bigger the organization becomes, the harder to maintain this ideal, so the usual countermeasure is to organize many small, nearly autonomous operating units within a big umbrella organization.

Development of first-line people to run and to improve processes autonomously creates a robust organization well beyond the shop floor. Military organizations call this readiness, a result of what everyone can do, not just a skilled few. Toyota practices readiness, measured indirectly: excellence by the usual measures, plus the ability to turn on a dime, or flexibility — being prepared to deal efficiently with a variety of changes.

No Staff Control of Improvement

When a company "goes lean," the tradition of managerial control is easily transferred to process improvement. If staff or specialists generate and implement most of the ideas, worker "empowerment" is generally limited to concurrence. They are not personally and deeply into see-it-yourself, do-it-yourself kaizen.

One sign of this is overly neat or graphically embellished problem-solving records. Workers' problem solving is typically done by hand on white boards or flip charts.

Another sign is work layouts fixed for long periods of time, whether on shop floors or in offices. Then implementing a change is a "big project." If everything is "on wheels," easily reconnected to utilities, working people can quickly try different ideas.

Summary of Lessons from Ohno's Method [5]

1. Besides the techniques employed, kaizen minimizes all kinds of waste by developing the capabilities and talent of all people for see-it-yourself, do-it-yourself improvement.
2. Kaizen is integrated into overall operations by standard work.
3. Develop process techniques to promote integrative kaizen and standard work.
4. Management's role is leadership developing all the people to autonomously work toward common ends.
5. Strive for a targeted ideal system. However, conditions change. All systems are transient, so people and systems must be flexible and adaptive, not just "optimal."
6. The basic TPS culture with kaizen and standard work can apply to any kind of organization – business, government, or non-profit.
7. The work culture is motivated by mutual survival and an appreciation for excellent work in itself. Financial returns may be tremendous, but they are a result, not a goal.

In repetitive work, a sign of grass roots kaizen deficiency is line balance. The average worker often has 40-50 percent slack time to look around or do other things. Staff-led kaizen may decrease slack time by 10-20 percent. The work pace may not be faster, but the intensity of concentration increases, and workers object. If they have removed the wasted time themselves, not only are they less likely to object, but remove an additional 10-20 percent of slack time besides. They are being treated as "real people."[4]

Probably the most telling sign of staff control is that workers or teams do not write their own instructions. "Yellow" work instructions, written by non-workers, are the telltale sign that standard work hasn't arrived. Workers are minimally involved.

Staff control of improvement (including kaizen blitzes) appears to arise when process improvement results, nicely measured, become important to staff/management status. Staff may fear "looking bad," "looking stupid," or "just being a worker's assistant."

By Ohno's Method, status accrues by evidence that leaders have done a great job of mentoring and coaching. The process may not at present win any performance awards, but if the entire workforce — every person in the headcount — is well practiced in process improvement, and if they can clearly see how the company needs to change or improve, the likelihood is great that *they will survive*.

An Excellence Culture is a Survival Culture

When TPS was in the making, Toyota, constantly near bankruptcy, was motivated by survival. (Late in his life, a British journalist for *The Economist* asked Ohno why TPS developed. Ever a crusty shop man, he said it was "the last fart of the ferret." When a ferret is cornered, it emits a powerful stench, something like a skunk.)

More than money motivated people. With survival at stake, within Toyota the inspiration to develop TPS has been described as "fighting a war."

Everywhere, when collectively in deep trouble, old ways obviously not working, and no point left in protecting anyone's status quo, people set aside their differences. Several lean stories in *Target* arose from a desperate situation.[6]

When money rolls in, a survival mentality fades; people without the survival experience reason that everything must be going along nicely, and start to talk about "winning and growing." Interest fades in operations, much less total human development, until the next crisis.

Normal business "incenting" isn't compatible with Ohno's Method. A collective survival mentality is. To do what they have never done before, people need a genuine, intrinsic conviction of the need for excellent work — motivation beyond mere profits and paychecks. At Toyota, the quest for a superior performance culture continues.[7]

Culture change never goes completely as planned. New work cultures emerge because leaders live them and demonstrate them. Ohno's Method, with its mentoring cascade of see-it-yourself, do-it-yourself, is one of the practical ways it has been done, and there is nothing artificial about it. Creation of a new culture goes hand-in-hand with creation of grass roots kaizen and standard work. Both are dependent on a different philosophy of business.

Footnotes:

1. Ohno, Taiichi, *Toyota Production System*, Productivity Press, Portland, OR, 1987, p. 22. This work was originally written in Japanese and published by Diamond, Inc., Tokyo, in 1978.

2. Ohno, Taiichi, *Toyota Production System*, Productivity Press, Portland, OR, 1987, p. 21.

3. See "The ABCs of Excellence," *Target*, Vol. 17, No. 3, Third Quarter, 2001, pp. 6-13.

4. Rinehart, Huxley, and Robertson; *Just Another Car Factory?* Cornell University Press, 1997. This book describes the lean system at CAMI, the GM-Suzuki joint venture in Canada, from the workers' perspective. This plant took a strike by the

Canadian Auto Workers in 1992, partly because of lean manufacturing. Reading the book, management obviously did not understand Ohno's Method, and so viewed lean manufacturing mostly as techniques, and a different way to control a plant. The workers were not scrupulously following work instructions, much less participating in standard work. They mostly went along with the program and disliked removal of slack time because it required more intense concentration.

5. From a summary of Ohno's papers and speeches in *Shop Floor Management: Gemba Keiei,* Nihon Norisku Kyokai, 2001 (in Japanese).

6. An example of lean methods being developed from scratch under the production pressures of World War II is "The Production Runs of the Century," by Bill Vogt, *Target,* Vol. 15, No. 1, First Quarter, 1999, pp. 9-21. The difference is that Toyota developed a lasting mind set from its period of distress. Boeing regressed.

7. See "Creating Competitive Advantage Through Ba," By Jinichiro Nakane and Scott Meza, *Target,* Vol. 17, No. 2, Second Quarter, 2001, pp. 6-14.

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