

Training, Continuous Improvement, and Human Relations: The U.S. TWI Programs and the Japanese Management Style

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W *Edwards Deming, Joseph Juran, and other American experts have rightfully earned their place in the history books for their significant contributions to the industrial development of Japan. However, the U.S. Training Within Industries (TWI) programs, installed in Japan by the Occupation authorities after World War II, may well have been even more influential. At least ten million Japanese managers, supervisors, and workers are graduates of the TWI programs or one of their many derivative courses, all of which remain in wide use in Japan in 1992. TWI has indeed had a strong influence on Japanese management thought and practice: a number of management practices thought of as "Japanese" trace their roots to TWI.*

The TWI programs were developed in the United States fifty years ago. They were designed to play a major role in boosting industrial production to the levels required to win the Second World War. Even though TWI did this very successfully, after the war the programs' usage dropped off until, in 1992, they are hardly used or even known in the United States.

The story is quite different in Japan. After the war, Japanese industry was running at less than 10 percent of its 1935 to 1937 levels. Faced with the threat of widespread unrest, starvation, and social disorder, it was only natural for the Occupation authorities to think of TWI, a set of programs specifically designed to boost productivity and quality on a national scale. While TWI had an impact on many countries around the world, it undoubtedly had its greatest effect on Japan. In 1992, even though the programs have changed little since their arrival in Japan, they are well-respected in Japanese management circles and are viewed as important enough to the national interest to be overseen by the Ministry of Labor, which licenses

instructors and upholds training standards throughout the country. Indeed, the Japanese government is now developing plans to export the TWI courses back to the United States (mostly in response to requests from Japanese-owned American companies), to developing countries in the Far East, and to Eastern Europe.¹

The TWI programs are distinctive, not because of the accepted principles of good management they cover, but because they are successful in getting these *used*. It is important for several reasons to have a good understanding of the programs, from their wartime beginnings in the United States to their widespread present-day usage in Japan. The programs are effective and their contents relevant; many companies could benefit greatly from them. They provide a successful example for governments to follow in order to raise national levels of productivity and quality. Furthermore, the TWI story adds a new perspective to the links between American and Japanese management thought and practice, and it teaches that the principles of good management are not as dependent on culture as many might think.

This article represents the results of more than three years of research in both the United States and Japan. In addition to archival research in both countries, more than 70 top managers in roughly 30 organizations in Japan were interviewed, as were Japanese government officials with past and present responsibility for TWI and its derivative courses. We located and interviewed a number of well-known present or former TWI instructors, including several who had been involved with TWI since its inception in Japan, and also several of the Japanese who translated the TWI materials after the departure of the Americans who had installed the programs in 1951. In the United States, we located and spoke with twelve people, including both surviving wartime TWI instructors, and also former U.S. Occupation forces personnel who served in decision-making capacities with respect to TWI in Japan during the Occupation period. Two of these people deserve special mention. First is Mr. Lowell Mellen, former President of TWI Inc., the company that was given the contract to install the TWI programs in Japan. He provided us with more than a dozen boxes of records which documented his company's activities in Japan. (These documents are now archived at the Western Reserve Historical Society in Cleveland, Ohio.) The second person was Mr. Edgar McVoy, the most senior living officer in the Economic and Scientific Section (ESS) of General MacArthur's command. (For seven years, ESS had oversight responsibility for TWI in Japan.) In addition to Mr. Mellen, many of our interviewees, both Japanese and American, passed their personal papers onto us.

In 1951, Mellen, the American most responsible for introducing TWI into Japan, made a statement that many Japanese believe remains true today:

In the training field, the Japanese have something American industry would do well to adopt.²

The Training Within Industries Service

TWI was one of the first emergency services established by the U.S. Government after the fall of France on June 22, 1940. It was clear that even if the United States never became a combatant in the widening war, it would still need to produce large amounts of goods and supplies for those who did. According to the Bureau of the Census at that time, over eight million U.S. citizens, including those on various government make-work projects, were unemployed.³ Most of these people had never been in a shipyard or seen the inside of a factory. It was obvious that gearing up for wartime production levels would have to involve the rapid training of millions of inexperienced workers, supervisors, and managers. The work of TWI, centered around improving productivity, was to become a critical factor in the ensuing war, which would be won as much in the factories at home as on the battlefields.

There was a precedent for such an effort. During World War I, the Emergency Fleet Corporation of the United States Shipping Board had organized an Educational and Training Section (ETS).⁴ Some of the senior figures in the TWI effort were veterans of ETS, whose instructor-training programs were precursors of those of TWI. Also in World War I, Congress had passed an act setting up a Council for National Defense, one of whose responsibilities was to supervise "the increase of domestic production of articles and materials essential to the support of armies and of the people during the interruption of foreign commerce."⁵

In 1940, this legislation was used to reactivate the Council, which was well aware of the importance of the task that lay ahead:

As we love freedom, we cannot fail to hurl the last ounce of our productive powers against freedom's greatest enemy. We must build two planes for Hitler's one, two tanks for his one, two ships for his one, two guns for his one.⁶

When it was first created by the Council for National Defense, TWI comprised 22 district offices around the country, staffed by experienced industry people and vocational education instructors on loan from their various organizations for the duration of the war. In addition to training, TWI's mission also included disseminating information and consulting on in-plant problems.

One of the first problems that TWI was asked to address was a critical shortage of skilled lens grinders, needed to produce precision lenses for wartime use. Government arsenals and navy yards had issued an urgent call for three hundred and fifty such lens grinders, but found few people who were properly qualified. The difficulty was that the craft of lens grinding took five years to master, far too long during such a crisis. When TWI specialists studied the situation, they found that the job of "lens grinding" was assumed to require mastery of 20 jobs, not all of which were skilled. The

anticipated wartime production volumes justified assigning relatively unskilled workers to do the simpler tasks, and that was done. TWI also improved the training program for new lens grinders, reducing its length from five years to two months. When the shortage ended, TWI used this early success to showcase the power of proper training. Before long, it elected to concentrate most of its effort on designing and running training programs, for it was clear that focussing on training rather than consulting would lead more directly to improved quality and increased productivity nationwide.

The inspired principle underlying TWI's training programs was what it called the "multiplier effect." The aim was to "develop a standard method, then train people who will train other people who will train groups of people to use the method."⁷ For the multiplier effect to work, the courses had to be designed carefully in order for them to be successful in all the situations in which they might be taught. They would be offered at companies in a wide variety of industries—these firms might be new ones, or rapidly expanding ones, or even ones simply continuing their peacetime production rates. Groups to be trained might include experienced, inexperienced, minority or women supervisors, and even people who reported to other people attending the same session. Young trainers might be teaching much older and more experienced supervisors. To ensure the programs' effectiveness in every possible circumstance, TWI rigorously field-tested each new course before it was released nationally. For example, Job Instruction Training (JIT), the first of TWI's famous three "J" courses, was trial-run in 70 plants over a period of six months.

Stringent quality control was also needed to sustain the multiplier effect. Trainers could be on "active" status only if they had taught a TWI course within the previous ninety days. They were required to adhere strictly to the lesson plans, which were outlined in detail in their manuals. The words "WORK FROM THIS OUTLINE—DON'T TRUST TO MEMORY" appear frequently in the manuals, in some cases on the bottom of *every page*. Also on each page are timing marks that indicate the desired rate of progress of each class. The manual shows the trainer exactly what to write on the board and when to write it. Furthermore, it is designed to be readable from 5 feet away, so that it is possible to adhere closely to it in a classroom situation.

TWI provided three standardized training programs for supervisors and foremen. The first, Job Instruction Training (JIT), taught supervisors the importance of proper training of their workforce and how to provide this training. The second, Job Methods Training (JMT), focussed on how to generate and implement ideas for methods improvement. The third, Job Relations Training (JRT), was a course in supervisor-worker relations and in leadership. (A fourth course, Program Development, showed plant training directors that production problems were usually linked to poor

initial training; how to spot the areas where additional training was needed; and how to set up appropriate training programs.)

All three “J” courses were structured in the same way: five two-hour sessions with 10-12 students, all supervisors, in each. In the first session of each course, known as the “Famous First,” a real-world problem was presented and a bad solution to it was given, carefully designed to hit home with many supervisors who might recognize something they would have done. Then the instructor presented the TWI “4-step method” and demonstrated how it enabled a much better supervisory action to be found. After the first session or two spent on learning methods, the remaining course time was spent on problems brought in by each supervisor for analysis and solution using the TWI method. TWI referred to this aspect of the course as “learning by doing”—a concept it attributed to Sophocles who wrote in 445 B.C., “One must learn by doing the thing; for though you think you know it you have no certainty, until you try.”⁸ It was this “learning by doing” that required the small class size. Upon completing a “J” course, each supervisor was given a wallet-sized card summarizing the appropriate TWI 4-step method, which could be consulted as a reminder of how to proceed in a particular situation. Figure 1 shows one such card for JMT, together with its 1992 (and almost identical) Japanese counterpart. The best performers in the training sessions were selected to attend Master Institutes, where they learned to be Institute Conductors, that is, people able to “train other people who can train groups of people to use the method.”

To convince top management that such standardized programs could help them to meet the unique needs of their business and to neutralize the standard rejoinder that “our business is different,” TWI devised an effective way of explaining the purpose of the “J” programs. It explained that supervisors have Five Basic Needs:

- Knowledge of the Work
- Knowledge of Responsibilities
- Skill in Instructing
- Skill in Improving Methods
- Skill in Leading

“Knowledge of the work” meant familiarity with the materials, machines, tools, processes, operations, and technical skills specific to the supervisor’s industry. “Knowledge of responsibilities” involved an understanding of a specific company’s situation, such as its rules, procedures, safety policies, interdepartmental relationships, and union contracts. TWI did not get involved in either of these two areas, because each was company- and industry-specific. It did, however, directly address, through the three “J” courses, the need for skills in instructing, improving methods, and leading.

Job Instruction Training (JIT)—Even prior to the U.S. entry into the war, business was booming for its defence contractors. From June of 1940 to June of 1941, the nation's airplane production increased by 300 percent, tank production by 600 percent, and production of gunpowder and ammunition by 1000 percent. According to a 1945 TWI report:

In 1942, approximately 6000 new workers were reporting for work every day as night shifts and extra day shifts became necessary. Four hundred workers who had had no experience in directing the work of other people were being appointed as supervisors every day.⁹

Without good training and safety practices, continuation of this rapid expansion might well have turned chaotic. JIT was the first TWI course; it was designed to help companies train their rapidly growing workforces, and was put into operation nationwide in October of 1941. By October of 1945, when TWI ceased field operations, 1,305,570 supervisors had been JIT-certified. These supervisors had, in turn, trained over 10 million workers, one-sixth of the nation's entire labor force of 64 million. The main object of the JIT course was to help "supervisors develop a well-trained workforce: have less scrap, rework, and rejects; have fewer accidents; have less tool and equipment damage."¹⁰

Experience with the lens grinding project had taught TWI the value of identifying "key points" of a job, that is, those critical points whose omission might cause injuries or other problems. JIT taught that the most important component of any training was the highlighting of these key points to the trainee.

In the Famous First session of the JIT course, the instructor told the assembled supervisors that about eighty percent of all production problems were attributable to poor training. Then, to demonstrate the value of proper training, an example was used involving the tying of the fire underwriter's knot, a knot used by electricians for safety purposes. The instructor invited one supervisor to serve as guinea pig, and *told* him or her how to tie the knot, verbally, but slowly, accurately, and in detail. The supervisor invariably failed to tie the knot properly, even after a few tries. The trainer then said [emphasis as in source]:

MUCH OF THE INSTRUCTION IN THE SHOP IS TELLING—THOUSANDS OF WORKERS ARE BEING TOLD AT THIS VERY MOMENT. HOW MANY OF THEM REALLY UNDERSTAND?

This kind of instruction is the real cause of some of the [types of production] problems [listed previously] on the problem sheet."¹¹

Next, the instructor asked for another volunteer. This time the trainer *showed* the knot-tying procedure, while making sure the trainee saw it backwards, as a new person would be likely to in real circumstances. Once again, the volunteer was usually unable to tie the knot properly, after which the instructor said [emphasis as in source]:

COUNTLESS THOUSANDS OF EMPLOYEES ARE BEING SHOWN HOW TO DO THEIR JOBS AT THIS VERY MOMENT. HOW MANY OF THEM UNDERSTAND?

If the worker hasn't learned, the instructor hasn't taught.¹²

Many supervisors recognized some of themselves in all this, and were at this point ready to be shown how they might improve. The instructor then demonstrated the TWI 4-step training method, in which:

- 1) the trainee is put at ease and made interested;
- 2) the job is taught with key points identified;
- 3) trial runs are made, and the trainee is obliged to explain and demonstrate the reason for each step; and
- 4) coaching is tapered off and the trainee is told whom to see if he or she has any problems or further questions.

The last 4 sessions of the course were used for "learning by doing." Each supervisor was required to bring in one real and current job and, in front of the class, train a classmate in it using the TWI approach.

Job Methods Training (JMT)—In addition to supervisors who knew how to train someone to do a particular job, industry also needed supervisors who could *improve* the way that jobs were done. Nationwide use of JMT, designed to produce such supervisors, began in September of 1942. By October 1945, 377,213 supervisors had been JMT-certified. The aim of the program was to "help you produce greater quantities of quality products in less time by making the best use of the manpower, machines, and materials now available."¹³

JMT taught supervisors to make incremental improvements continually to processes and operations, how to generate such improvements, and the importance of putting their improvement suggestions in writing. To make it clear to workers and their unions that JMT was not a speedup program in disguise, union officials were invited to sit in on JMT classes, to see for themselves that the program was intended to make people work smarter, not harder.

JMT was based on well-established principles of Scientific Management. In the Famous First session, the trainees were introduced to an apparently efficient radio-shield assembly operation. However, a job breakdown, combined with a critical analysis of each step, then achieved a 300 percent increase in production with no more effort than before. The supervisors were then receptive to the TWI 4-step method, which was straightforward and basic:

- 1) break down the job into its constituent operations, that is, moves, inspections and delays;
- 2) question every detail (why? what? where? when? who? how?);

- 3) develop the new method by eliminating, combining, rearranging and simplifying all necessary details; and
- 4) apply the new method by selling it to everyone.

The fourth step, which aimed to ensure that the improvement idea was actually implemented, was a critical one. The supervisors were advised to consider the boss's objectives, to show that their suggestion met these objectives, to solicit the comments of people who would be affected by their suggestion, to write up the improvement proposal, and to take action as quickly as possible. Corporate suggestion systems were not new, of course, since they predate TWI by many years. They were, however, far from widespread in U.S. industry at that time. In most of these systems, this important fourth step was ignored.¹⁴

JMT was careful to instruct supervisors to give credit when due and, in particular, never to steal ideas from their workers, since "One stolen idea will stop all others."¹⁵ JMT also taught that methods improvements were a regular part of the supervisors' jobs, not something they should expect to be paid extra for.

To "learn by doing," each supervisor was required to find a job in his or her plant, break it down, improve it, and submit the written improvement proposal. Each student was urged to *keep making* such improvements when they returned to their workplaces:

Remember there will always be a better way. Keep searching for further improvements.¹⁶

Because process improvement might mean that fewer workers or machines are needed to perform the same amount of work, sensitive employment issues tend to arise. Although it did not want to, TWI was forced to take positions on such issues raised by its JMT program. It provided its instructors with answers to several difficult and frequently asked questions. For example:

[**Question:**] What should be done if employees are eliminated as a result of a methods change?

[**Answer:**] This problem is solely one for the company to handle. . . . [however] it is recommended: that no one ever be laid off as a result of a methods change but that an employee thus affected be transferred.¹⁷

Job Relations Training (JRT)—In January of 1941, the National Academy of Sciences was asked the following question: "What can be done to increase knowledge and improve understanding of supervision at the work level?" The answer came back: "Improving and accelerating the training of supervisors in handling the human situations under their charge so as to secure maximum cooperation."¹⁸ This advice was taken, and resulted in the national release in February of 1943 of the Job Relations Training (JRT) course.

The JRT instructor opened the “Famous First” session by telling the assembled trainee supervisors that:

When a machine is installed in a department, a hand-book comes with it—or there may be a mechanic specially qualified in how that particular piece of machinery works, and directions on how to keep it in good operating condition, or what to do when it breaks down.

Supervisors get new people all the time, but instruction books don’t come with them. Yet a worker is much more complicated than any piece of machinery in your department or shop.

How are you going to keep that new person in top form? What will you do if he fails?

Employees will tend to judge the whole plant in terms of the treatment they receive from their immediate boss.¹⁹

The instructor then told the story of a rocky relationship between a supervisor and Joe, one of his best workers. Joe often didn’t show up on the job because he could make enough money working only some days a week. His absenteeism had become a source of friction with his supervisor, who couldn’t get Joe to work a full schedule. Then Joe got married, and for a few months he came into work every day, since he now needed the extra money. One Monday, after a substantial company-wide pay increase, Joe failed to show up for work. It seemed that he could again afford to take a day off each week, and had reverted to his old ways. The supervisor decided to teach him a lesson, and suspended him for one week without pay. Usually, a good number of supervisors in the JRT class would agree with this course of action.

But then, a few days later, a colleague remarked to the supervisor that he’d heard the supervisor had been very tough on Joe, whose father had been hurt in an automobile accident on Sunday night. Joe had asked his neighbor to get word to the supervisor but his neighbor had forgotten to do this. Joe’s supervisor saw his mistake, but it was too late, for he had already caused problems with those he supervised, and therefore with production.

At this point, the class was ready for the TWI 4-step method for dealing with Job Relations problems:

- 1) *get the facts* (be sure you have the whole story);
- 2) *weigh and decide* (don’t jump to conclusions);
- 3) *take action* (don’t pass the buck); and
- 4) *check results* (did your action help production?).

The course next discussed how to prevent such problems from arising in the first place: *let each worker know how he is getting along; give credit when due; tell people in advance about changes that will affect them; make the best use of each person’s ability; win the worker’s loyalty and cooperation; and treat people as individuals.*

There was also strong demand from labor unions to start up JRT for their shop stewards. But union leaders felt that if all references to “supervisors,”

“managers,” and “workers” were removed from the JRT course it would gain much wider acceptance from their unions. Accordingly, in early 1945, TWI released the cosmetically changed JRT course under the name “Union Job Relations Training” (UJRT). By the end of the war, 628,822 supervisors were JRT-certified, and 8,856 stewards were UJRT-certified.²⁰

The Impact of TWI on the War Effort

TWI was rightfully given much credit for the successful rapid expansion of U.S. industry in the war. By the time TWI was deactivated in the fall of 1945, 1,750,650 certificates had been issued to supervisors from 16,511 plants. A further 571,640 government supervisors, and even some German P.O.W.s, also received TWI training and certification.

TWI training did generate some impressive results. One, for example, was at the Consolidated Steel Corporation, an Orange, Texas shipbuilder with 18,749 employees, of whom 2,850 were certified in JIT, 800 in JMT, and 540 in JRT (every supervisor was certified in one or more of the “J” programs). The company reported that over a four-year period it could attribute the following results to TWI:²¹

Increase in production	45%
Reduction in tool breakage	75%
Reduction in training time	78%
Saving of manpower	45%
Reduction in scrap	69%
Reduction of accidents	70%

The president of another company reported his firm’s TWI training results with the following plea to keep the numbers confidential:

Under no circumstances do I want you to make public my name or that of my company. While I want you to know what this program has done for us, still I must not have it known to some of my stockholders, who would immediately ask “What have you, Mr. President, been doing all these years to overlook such a possible reduction in expenses which would have meant increased dividends to us?”²²

To measure the broader impact of its programs, TWI monitored 600 of its client companies throughout the war. By September of 1945, the results from this group of firms indicated that TWI had indeed had a significant impact on their performance. The following are the percentages of these firms reporting an improvement of *at least 25 percent* in each of the following areas:²³

Increased production	86%
Reduced training time	100%
Reduced labor-hours	88%
Reduced scrap	55%
Reduced grievances	100%

TWI Abroad

When TWI was deactivated as a government agency in the Fall of 1945, many of its former employees found that their services were still in demand, and opted to continue providing TWI training on a private basis. The Training Within Industry Foundation, for instance, was incorporated in New Jersey in 1946 by the people who had headed the wartime TWI service.²⁴ Its mission was the same as that of its progenitor: to continue training industry to be self-helping. The Foundation, together with other similar organizations founded by former TWI staffers, took the TWI programs abroad after the war. In some cases these activities were sponsored by the U.S. Government, in others by the host government:²⁵

- TWI had actually been started in Great Britain at the peak of the war in 1944. Its lasting impact there was testified to in a 1969 speech by Mr. Roy Hattersley, then a senior official in the British Department of Employment and Productivity:

TWI is Britain's most widely used supervisor training scheme and has been sponsored and developed by my Department for almost a quarter of a century. During that time more than one million supervisors have attended courses and many of the largest firms in the country have based their own comprehensive training schemes on TWI's foundations. . . . the demand continues to grow. The number of supervisors trained has almost quadrupled over the last five years. The demands on the D.E.P. training services have increased sixfold over the same period.

These are improvements which must be maintained if the country is to achieve lasting prosperity, for our industrial training [programs] are an essential part of our more general plans for building a strong and productive economy. They are irrevocably linked with our proposals for improved productivity.²⁶

- As part of the reconstruction of Europe, TWI training programs were set up in France, Italy, Belgium, Holland, Luxembourg, Denmark, Sweden, Norway, and Finland.
- In 1947, New Zealand set up its own government-run TWI Service. Department of Labor reports indicate that TWI was very widely used at least up until 1969. The "J" programs were taught to supervisors in the railways, the post office, the meat industry, the wool industry, utilities, auto dealerships, banking, grocery stores, and even in the Treasury when it had to convert New Zealand's currency over to the decimal system. New Zealand's TWI Service, together with private industry, introduced TWI programs into many other countries, including Australia, New Guinea, Hong Kong, Fiji, Taiwan, Singapore, Western Samoa, Iraq, Uganda, and South Vietnam.
- TWI programs were prepared for Korea, although they were never run owing to the Korean War. TWI did eventually percolate into Korea through Japanese companies, and it is used there today.
- Over 3 million supervisors in Indonesia were TWI-certified in the period 1951-1953.

- 1000 Mexican supervisors from 50 plants received TWI certification under the aegis of the Centro Industrial de Productividad in Mexico City in 1956 and 1957.
- 5000 Turkish supervisors from 100 companies, collectively employing over 200,000 people, had received TWI training by 1956.
- 1226 supervisors were trained in Nepal in 1958.

While TWI had an impact on many countries around the world, it had its greatest effect on Japan, which embraced the “J” programs more wholeheartedly than any other nation.

Training Within Industries in Japan

The U.S. Occupation of Japan, commanded by General Douglas MacArthur, lasted from 1945 to 1952. Its overall mission was to break up the militarism that had become widespread in Japan both before and during the war and to replace this with a more democratic system. But the effort would get nowhere unless Japanese industry, which by the end of the war was running at less than ten percent of its 1935-37 level,²⁷ was not restarted first. The Occupation authorities felt that, unless this was done quickly, mass starvation, widespread unrest, and worker communism would result. Japan's need for trained supervisors was clear, as a 1949 Occupation Army memorandum observed:

Supervision is ordinarily a “haphazard,” rule-of-thumb process, and . . . in-plant training is characteristically done by putting a new man under an experienced worker to pick up his skills as well as he can. Such practices are incompatible with modern industrial methods and with the achievement of high output per worker. Neither industry nor government has developed a suitable program for the adequate training of supervisors in industrial establishments. The improvement of technology, machinery and raw materials will not assure a substantial increase in production unless the supervisors and the workmen are prepared to utilize their elements in the most effective manner.²⁸

Several members of General MacArthur's staff had worked in the War Manpower Commission during the war, and were familiar with the TWI programs. They felt that not only would TWI be ideally suited to train supervisors, but that it would also forward the Occupation's main goal of introducing more democratic practices into the workplace. The decision was made, and requests for proposals were sent out. The Department of the Army received two bids for the job, one from the TWI Foundation and the other from TWI Inc. of Cleveland, Ohio. Although TWI Inc. bid considerably higher than the TWI Foundation, it was nevertheless awarded the contract because its proposal was more comprehensive and long-term in scope. In other words, TWI Inc. planned to trigger the multiplier effect, and the Foundation did not. The president of TWI Inc. was Mr. Lowell Mellen,

who had been the wartime TWI District Representative for Northern Ohio. Mr. Mellen brought with him to Japan three other training specialists, all of whom had been TWI instructors during the war.

Before the arrival of the American TWI specialists, the Japanese Labor Ministry had set up a small TWI working group.²⁹ This group had sent one member abroad to a JIT Institute directed by the International Labor Organization (ILO). It had also obtained copies of TWI manuals from which to work, and had trained ten of its members as TWI Institute Conductors. Before the arrival of the TWI Inc. specialists in 1951, this group had processed approximately 500 JIT trainers and 70 JMT trainers. Unfortunately, according to the newly-arrived American specialists, these efforts had lacked the rigid quality control and attention to detail necessary to trigger the multiplier effect.

TWI Inc. contracted to help the Japanese Labor Ministry implement proper TWI training. It was to run Master Institutes in the three “J” programs: JIT, JMT, and JRT. Each course was the responsibility of one of the American specialists. The fourth specialist was an expert in “plant installation” of TWI programs, which mostly involved selling the value of TWI programs to top management. In the six months it would be in Japan, TWI Inc. would select and prepare Follow-Through Trainers, Quality Control Specialists, and Installation Specialists, and it would produce a core of Institute Conductors, that is, people who could train instructors. If all went according to plan, the same “multiplier effect” that had been so successful in the United States would be triggered, and the TWI programs would spread rapidly throughout Japanese industry and perpetuate themselves.

The first task for the American specialists, upon their arrival in Japan, was to get publicity for themselves and the “J” programs they were to install. This was done through the press, and government and military authorities. There was no choice but to teach in English, which posed some difficulties, because most of the operating personnel that the “J” programs were aimed at could not speak English. (It was only after the departure of TWI Inc. that the manuals were translated into Japanese.) Trainees were chosen from as wide a selection as possible of industry groups. Industries that were not represented in these American-run sessions were to have training provided later by the Labor Ministry’s own TWI specialists.

As had happened in the United States, labor unions expressed concern about possible nefarious motives behind the government’s introduction of TWI programs into Japan.³⁰ But a British labor representative told the Japanese unions of the help TWI had given to both management and workers in Britain, and of how Britain’s Labour government also supported TWI, even to the extent of subsidizing courses held at private companies. The backing of the International Labor Organization, and careful explanations that the purpose of the “J” programs was to train supervisors to be better and not to make workers work harder, also served to assuage these fears.

When the TWI Inc. specialists departed from Japan, they left behind them 35 certified Institute Conductors, the beginning of a large multiplier effect, which extended to over one million Japanese managers and supervisors by 1966,³¹ and to many millions more by 1992.

In 1948, the Labor Ministry created the Japan Employment Problem Association (JEPA) to administer the TWI programs and to disseminate them throughout Japanese industry and government. While JEPA has kept little statistical information about the TWI courses it has taught, it did have figures for 1990 and 1991, when it trained 2,450 and 2,490 new TWI instructors respectively. Based on sales of TWI cards, the wallet-size cards summarizing the TWI 4-step methods handed to every supervisor upon graduation from a "J" course (see Figure 1), it is possible to estimate fairly accurately the number of graduates of official TWI courses in 1990 at 66,700, and in 1991 at 64,000.

Currently, the Labor Ministry also licenses a number of other organizations to conduct the "J" courses (which are referred to in Japan as JI, JM, and JR), and to produce new TWI instructors. Dominant among this second tier of organizations in 1992 is the quasi-governmental Japan Industrial Training Association (JITA), created jointly in 1955 by the Ministry of International Trade and Industry (MITI) and *Nikkeiren* (the Japan Federation of Employer's Associations).³² From 1955 to 1992, JITA has produced 18,292 new TWI instructors. Other organizations currently licensed to teach TWI include one third of Japan's forty-six prefectural governments, the Institute of Vocational Training, the Employment Research Institute (which has no official English name), and the Japan Ability Development Association (which runs TWI primarily for workers, rather than managers).

Even approximate figures for the total number of Japanese supervisors who have received TWI training are difficult to obtain, because of the extent to which the programs are diffused throughout Japanese government and industry. Many companies send employees to official TWI courses to become instructors, after which these people return to their own firms to set up and run their own TWI courses, often slightly modified and under a different name. Canon Inc., for instance, has approximately 44,000 employees worldwide, and a relatively large training staff of 1,200, every one of whom is required to be certified as a TWI instructor. In each of its plants, the company runs its slightly modified versions of the three "J" courses approximately five times a year, for low-level supervisors and workers. Another example is Toyota, which runs its own version of TWI, called "TTWI," for "Toyota TWI." In 1989, the Justice Department adopted TWI for use in vocational training and social rehabilitation of prisoners. This kind of intramural growth means that much of the TWI effort is very hard to document. Further complicating the picture are the number of present-day courses derived from TWI. Although there are a number of these, it is easiest to illustrate the phenomenon with the following examples:

Figure 1. The TWI Cards in 1945 and 1992

1945 JMT card (front)

**HOW TO IMPROVE
JOB METHODS**

A practical plan to help you produce
GREATER QUANTITIES of QUAL-
ITY PRODUCTS in LESS TIME, by
making the best use of the Manpower,
Machines and Materials, now available.

STEP I—BREAK DOWN the job.

1. List all details of the job exactly
as done by the Present Method.
2. Be sure details include all:
 - Material Handling.
 - Machine Work.
 - Hand Work.

*"Write it as you see it
Not as you remember it."*

STEP II—QUESTION every detail.

1. Use these types of questions:
WHY is it necessary?
WHAT is its purpose?
WHERE should it be done?
WHEN should it be done?
WHO is best qualified to do it?
HOW is the "best way" to do
it?
2. While questioning consider:—
Materials, Machines, Equip-
ment, Tools, Product Design,
Layout, Work-place, Safety,
Housekeeping.

"Write down each idea."

1945 JMT card (back)

STEP III—DEVELOP the new method.

1. ELIMINATE unnecessary details.
2. COMBINE details when practical.
3. REARRANGE for better se-
quence.
4. SIMPLIFY all necessary details:
 - Pre-position materials, tools and
equipment at the best places in
the proper work area.
 - Use gravity-feed hoppers and
drop-delivery chutes.
 - Let both hands do useful work.
 - Use jigs and fixtures instead of
hands for holding work.
5. Work out your idea with others.
6. Write up your proposed new meth-
od.

"Make the work easier and safer."

STEP IV—APPLY the new method.

1. Sell your proposal to your "boss."
2. Sell the new method to the oper-
ators
3. Get final approval of all concerned
on Safety, Quality, Quantity, Cost.
4. Put the new method to work. Use
it until a better way is developed.
5. Give credit where credit is due.

"Continue until a better way is found."

**JOB METHODS PROGRAM
TRAINING WITHIN INDUSTRY, INC.
14600 DETROIT AVE. CLEVELAND 7, OHIO**

1992 JM card (front)

(JM資料1)

改善の仕方

現存の労力、機械および材料を最も有効
に使うことによって、短時間に、よい品質
のものを多量に生産するのに役立つ実
際的方法

第1段階——作業を分解する

1. 現在方法をそのまま、作業の全細
目を記録する
2. 一運搬作業
一機械作業
一手作業
は全部細目になる

第2段階——細目ごとに自問する

1. 次の自問をする
なぜそれは必要か？
その目的はなにか？
どこするのがよいか？
いつするのがよいか？
だれが最も適しているか？
どんな方法がよいか？
2. 同時に次について自問する
材料、機械、設備、道具、設計、
配置、動作、安全、整理整頓

1992 JM card (back)

第3段階——新方法に展開する

1. 不要な細目を取り去る
2. できるなら細目を結合する
3. 細目をよい順序に組み替える
4. 必要な細目を簡単にする
作業をもっと楽に安全にするために
—材料、道具および設備を適当な
動作範囲の最もよい位置に置く
—重力利用の補給装置や、落下送
出装置を用いる
—両手を有効に用いる
—手で支えるかわりに治具や、取
付具を利用する
5. 他人の力も借りて考える
6. 新方法の細目を記録する

第4段階——新方法を実施する

1. 新方法を上司に納得させる
2. 新方法を部下に納得させる
3. 安全、品質、生産量、原価の関係
者に最後の承認を求める
4. 新方法を仕事に移す。次の改善が
できるまで用いる
5. 他人の功績は認める

労働省職業能力開発局
(不許複製)

- *The Management Training Program (MTP)*—Introduced into Japan by the United States Air Force in 1949, this 10-day course for middle managers is in wide use today. More than half of this course consists of the JM, JI, and JR courses of TWI. MTP falls under the purview of MITI, which has backed it strongly since 1951. Officially (and, like TWI, the majority of MTP activity is unofficial), 3,300 MTP instructors have been produced and 1.2 million middle managers have graduated from MTP since 1951.
- *The Jinji-in Supervisor Training (JST) course*—Jinji-in is the National Personnel Authority of the Japanese government. In 1952, it modified the MTP course to make it more suitable for government administrators, largely by dropping material in MTP related to manufacturing. JST is currently used to train middle managers throughout Japanese government and in the banking and finance industries. As of 1992, Jinji-in has produced 38,912 JST instructors and has certified a further 1.3 million managers.
- *The Tokyo Supervisor Training course*—Derived from JST, this course is taken by middle managers in the Tokyo municipal government.

Many of the teachings of TWI have percolated so deeply into Japan that their origins are sometimes forgotten even by *Japanese* management experts. Witness, for example, the following passage, unadorned by any reference to TWI, taken from *The Improvement Book*, published in 1989 by Tomo Sugiyama, a former member of the Board of Directors of Yamaha Motors and presently a leading consultant on factory management:

People in supervisory positions have to master five basic areas of knowledge or skill:
Knowledge of the work . . . Knowledge of responsibilities . . . Job instruction skill
*. . . Leadership skills . . . Skill in improving job methods.*³³

These five areas, of course, are precisely the Five Basic Needs of supervisors (described earlier in this article) that the wartime U.S. TWI service developed to sell its programs to top management. Likewise, Masao Nemoto, in his book *Total Quality Control for Management*, a popular business school text, a number of times makes the JI-like point that “If workers do not understand, the fault lies with the method of teaching.”³⁴

While it may not be so easy to arrive at hard statistics for the precise extent of usage of TWI in Japan, it is possible to assess *qualitatively* its influence on Japanese management.

The Influence of TWI on Japanese Management

A recent *Economist* survey of worldwide management education³⁵ noted an important difference in practice between Japan and most other developed countries in this regard. In Japan, most management training is done within industry; elsewhere it is done primarily in professional schools. Although

it would be hard to pin down exactly, it is not unimaginable that TWI had something to do with Japan's choice of within-industry model of management education. Certainly, TWI provides a visibly successful example of such a model—one that is also backed strongly by the government. Furthermore, since most training is done in-house, and often prominently features TWI and its derivatives, it is perhaps not surprising that the lessons of TWI have percolated so deeply into Japanese management.

Each of the “J” programs has influenced Japanese management in its own way. According to Mr. Nobuo Noda, a prominent Japanese business scholar, both JI and the TWI programs as a whole offered

a new pattern of “how to teach.” Because Japan had lost much of its skilled labour force during the war, it was just what was needed and soon spread throughout the country—until TWI-instructed trainers could be seen in almost every factory.³⁶

JM is often credited for its role in the development of *kaizen* (“continuous improvement”) in Japan, now a distinctive part of the management style of that country. For example, *The Idea Book*, a recently-translated Japanese book about *kaizen*, states that:

The forerunner of the modern Japanese-style suggestion system undoubtedly originated in the West. . . . TWI (Training Within Industries), introduced to Japanese industry in 1949 by the U.S. occupation forces, had a major effect in expanding the suggestion system to involve all workers rather than just a handful of the elite. Job modification constituted a part of TWI and as foremen and supervisors taught workers how to perform job modification, they learned how to make changes and suggestions. . . . Many Japanese companies introduced suggestion systems to follow up on the job modification movement begun by TWI.³⁷

In other words, JM is a course in continuous improvement. It not only indoctrinates people into an “improvement” frame of mind, but teaches them how to find opportunities for improvement, how to generate ideas to take advantage of these opportunities, and then how to get these ideas put into practice. The results of such training can be impressive, and are not hard to document. Table 1 gives information about the *kaizen* programs of the ten Japanese companies that received the most suggestions from their workers in Fiscal 1990 (April 1990 to March 1991). Individual rates can go much higher. During a 1990 visit to the Saiyama plant of Honda Motor, one of the authors was told that the top suggester there had submitted an amazing 1500 suggestions in 1989. Table 2 gives information at the national level for both the United States and Japan.

Toyota was among the earliest companies to adopt the TWI programs. The Toyota Production System (the first just-in-time system) is also a system of managing continuous improvement. So it is perhaps not surprising that Masao Nemoto, the current President of Toyoda Gosei and a former managing director of Toyota, credits TWI with playing a part in the development of the Toyota Production System:

Table 1. The Ten Most Active Kaizen Programs in Japan, 1990

Company	Total suggestions	Ideas per person
Kawasaki Heavy	6,980,870	426.5
Nissan	6,043,344	126.9
Toshiba	4,166,864	76.6
Matsushita	4,114,398	43.7
Mazda	2,417,264	113.0
Toyota	2,003,646	35.0
Otu Tire	1,475,707	1,185.3
Nihon Victor	1,247,523	83.1
Nissan Diesel	1,169,745	226.8
Fuji Heavy Industry	998,359	88.1

Source: The Japan Human Relations Association, Summary of Japanese Suggestion Activities Survey, 1991.

I endeavored to create an atmosphere which was conducive to raising our ability for improvement. An instructor's license I held in the "training within industry (TWI)" was a definite plus. While utilizing my own ideas, I never forgot to solicit ideas actively from those supervisors who worked for me.

This decade [1950-1960] coincided with the period when Toyota was thoroughly training its employees in the now well-known Toyota production system. As a TWI instructor, I worked night and day to inculcate the virtue of the Toyota system to the employees who worked under me. It was a period filled with "improvement after improvement."³⁸

It would be inappropriate to leave the reader with the impression that the major impact of TWI on Japanese industry is limited to the areas of training, written suggestion programs, and *kaizen*. JR, the third course, is credited with introducing more progressive human relations into Japan. In an August 1951 interview conducted as part of a survey of the effects of TWI on Japanese management by International Economic Services Ltd., a Tokyo consulting firm, Mr. Takei of the Mitsui Mining Co., the largest coal mining company in Japan at the time, said that he felt the "concept of humanism in industry" was one of the most appreciated ideas transmitted into Japan by TWI.³⁹ Mr. Lowell Mellen confirmed this:

Prior to the introduction of American training concepts this year, . . . foremen performed the traditional "straw boss" role religiously and were regarded as "whipping boys" by both management and rank-and-file [employees]. Now they participate in conferences which set management policy and have all but abandoned the movie version of Japanese bowing and scraping.

The development in industrial foremen . . . is the logical conclusion of the steady indoctrination in political democracy given so rigorously to all sections of the Japanese population by General Douglas MacArthur and his successors of the American occupying force.⁴⁰

Table 2. Comparative Statistics at the National Level, 1990

	USA	Japan
No./100 employees	11	3235
Adoption	32%	87%
Participation	9%	72%
Average Reward*	\$491.71	\$2.50

Source: 1991 National Association of Suggestion Systems and Japan Human Relations Association Statistical Report. (Based on 336 reporting organizations in the U.S. and 696 in Japan)

*U.S. suggestion systems tend to reward employees based on the value of their idea to the company. Japanese companies tend to reward participation and attitude with lesser sums of money. The exchange rate in 1991 was \$1 = ¥ 130.

This humanism included a newfound respect for individuals. For instance, TWI Inc.'s specialists reported that when the programs were first presented:

[The Japanese trainees] were not accustomed to conference type of meetings, especially where so much free discussion was permitted, as we had. They seemed to enjoy it and grasped it readily.⁴¹

One idea-stifling practice, for example, had been to forbid anyone at a meeting to speak until all those who had joined the company before that person had spoken.

Perhaps not surprisingly, JR is the only TWI course that appears to have stirred up any controversy in Japan. The most severe criticism of it came from a senior Japanese academic who specializes in management training. He told us bluntly that he did not feel JR has caught on in Japan as much as its sister courses, because its primary emphasis is on solving human relations problems rather than on preventing them in the first place. Although the JR course does address problem prevention, this comment is an accurate one.

TWI also helped to introduce more meritocratic promotion schemes into Japan:

Another American importation brought to Japan's industry by Mr. Mellen's staff is the promotion from within policy that is rapidly gaining acceptance throughout Japan. Prior to the end of World War II, top management consisted entirely of owners and their relatives with a sprinkling of college graduates educated in Japan or, preferably, in the United States or Germany. . . . Now first in line supervisors and even rank-and-file [employees] are being advanced to top management positions. This trend, Mr. Mellen declared, represents an "absolute triumph of American thinking as applied to Japanese industrial philosophy which up to now was never anything but the pre-Perry feudal setup super-imposed on one of the most modern industrial economies in the world."⁴²

A good number of our Japanese interviewees stressed that TWI has done much more for Japan than just bequeathing a collection of techniques to it embodying basic good management. First, it has taught managers and supervisors to appreciate the scientific and rational approach to management. Although each “J” course is about a different aspect of the manager’s job, each teaches the same approach to a situation: get the facts, analyze them, and then act upon the resulting information. The second important thing that TWI has done, it was felt, has been to get the message across that good human relations are *good business practice*, a message that is given credit for helping to break up the tradition of autocratic management prevalent in Japan before and during the war.

Lessons of TWI

Much can be learned from the TWI experience. Those seeking productivity and quality improvements at the national level might draw the following lessons from TWI:

- In order to make the most effective use of limited resources, it may be better to put the primary emphasis on *training*, rather than on providing consulting and problem-solving assistance. The TWI service, which stressed consulting and problem-solving in the beginning, soon realized that because of the individual nature of each project, this approach was dissipating the overall direction and effect of its efforts.
- The content of the training programs is very important. They should contain only common-sense and accepted management principles that fit well with perceived and actual national needs at the time of training delivery. To maximize acceptance and effect, the courses should go deeper than mere techniques: they should attempt to instill a new set of values (presently absent) which, when embraced, will result in profound changes in the workplace.
- The programs should be designed to be punchy and to integrate plenty of on-the-job reinforcement into the learning process. Techniques to be covered should be chosen as the “big hitters” in proven practical effect, and not because they are on someone’s “wish-list.” The courses should be designed for “robustness,” that is, they must be generic, and capable of being put across in a wide variety of circumstances. In addition, if the courses are standardized for uniform format and delivery, this will help lay the groundwork for triggering the multiplier effect.
- Government participation can act as a strong impetus. The TWI experience in Japan and the U.S. suggests that rather than running the whole system directly, government involvement should be limited to providing the moral backbone and legitimizing force of the training programs. That is, while delegating day-to-day activity, government should retain final control over the course contents and the licensing of instructors.

- To the extent possible, training results should be tracked at the enterprise and national levels, and all activities should be well documented.
- As with TWI in Japan, any revisions to course materials should be centrally supervised and occur through a formal and national consensus review process. (In its forty-five years, TWI has undergone two such revisions.)

Concluding Discussion

The prevalence of the TWI programs in Japan, and their continued strong backing by the government of that country, raises several interesting questions. First, if the TWI programs were so good, why did they die out in the United States after World War II? We put this question to a number of people, and the consensus appears to be as follows. During the war, the TWI service was part of the U.S. government, which strongly urged, although it did not compel, companies seeking contracts from it to use the TWI programs. After the war, when the TWI service was defunct, this impetus evaporated. In addition, in 1945 the United States was one of the few developed countries with an industrial base that was still intact. Its industry had little competition, and hence did not have much incentive to improve.⁴³

A second question is whether training programs developed fifty years ago, and changed little since that time, can have relevance today. The reason why the Japanese Labor Ministry continues to champion these programs is the timeless nature of the material they teach: the principles of instruction, continuous improvement, and human relations. While the first two of the Five Basic Needs of Supervisors—"knowledge of the work" and "knowledge of responsibilities"—have changed a lot, the "skills in instruction," "skills in improving methods," and "skills in leadership" have changed relatively slowly. Recently, a medium-sized Western Massachusetts plastics manufacturer has had great success with the 1945 TWI programs, which it intends to use with all its employees. Interestingly, it was able to find all the TWI instructional materials for its courses in the University of Massachusetts library. One of the final acts of the TWI service before it was disbanded was to place its materials in many major libraries around the United States.

A final question addresses how the information presented in this article fits into the conventional understanding of the history of the development of modern Japanese management practices. Specifically, Deming and Juran are credited by many observers for their prominent role in the industrial renaissance of Japan. How does the contribution of TWI in this regard relate to theirs? Here again a consensus emerged among the managers and academics we spoke to in Japan: Deming's and Juran's influence on Japan was on the conceptual and inspirational level. For example, the prize that Deming endowed with the royalties from his 1950 lectures on quality

control in Japan became something for Japanese companies to strive for. TWI, on the other hand, was on the front lines. It was one of the things used, on the practical level, to translate these newfound values and this inspiration into action, which it did by training millions of Japanese workers, supervisors, and managers around the country.

The need for proper training of workers and managers in how to do their jobs and to improve productivity—continually, sustainably, and in a human way—will never disappear. The TWI programs contain very little that is new. They are distinctive not because of the accepted principles of good management they cover, but because they are successful in getting them used, and on a national scale. That, surely, is something any country could benefit from.

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23. *Ibid.*
24. Dietz, op. cit.; *Fortune Magazine* (April 1951), p. 119.

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29. Ibid.; Training Within Industry Inc., *Final Report Upon Completion of Contract to June 4, 1951 with the Department of the Army* (Cleveland, OH: 1951).
30. Ibid.
31. This is the estimate of Mr. Kondo Eiichiro, one of the graduates of Mr. Mellen's Master Institutes in Japan, who subsequently became regarded as the leading Japanese authority on TWI. It was communicated to the authors by the Secretary General of the Japan Employment Problem Association, which is discussed further in the next paragraph of the article. TWI Inc. explored the possibility of continuing its work in Japan on a private basis, but chose not to for several reasons. First, the customary rates for corporate training programs were too low for a Japanese division of TWI Inc. to be profitable. Furthermore, it was not clear that the Japanese authorities would allow TWI Inc. to remit earnings to the United States. Finally, TWI Inc. found that many Japanese felt strongly that TWI was too important to be controlled by foreigners, and were urging the government to take charge of the programs. This was, in fact, what happened.
32. JITA is also in charge of the Civil Communication Section (CCS) course for top management, which set the stage for the Japanese quality control movement and the later visits of American quality control experts such as W. Edwards Deming and Joseph Juran. The story of this course—one also developed by the American occupation forces—has been thoroughly documented in K. Hopper, "Creating Japan's New Industrial Management: The Americans as Teachers," *Human Resource Management* (Summer 1982), pp. 13-34. It was an American member of the CCS staff, for example, who is believed to have first advised Japanese industry to adopt statistical quality control. The CCS course was last taught in 1974, although it is still honored by being listed first in the present-day JITA catalog.
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43. Interestingly, Jack Greenland, a former TWI Inc. employee told us that the reason his company went to Japan was the lack of demand for its services in the United States.