
REVISITING DEMING'S 14 POINTS IN LIGHT OF JAPANESE BUSINESS PRACTICES

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This article describes an interpretation of Deming's 14 points from the perspective of Japanese business practices. It especially focuses on Deming's three principles: holistic thinking, cooperation, and desirability. These three principles were developed by Deming by observing Japanese business practices. They led Deming to derive his new theory of system optimization, which states that interdependent components must be orchestrated to accomplish the common aim of the system.

During the 1980s, American management integrated the concepts of long-term vision, continuous improvement, and teamwork into its traditional management style; however, many signs of receding interest in quality management have recently appeared. Now that the American economy is improving, the salaries of U.S. executives are skyrocketing. At the same time, in the name of restructuring or downsizing, many large companies are cutting employees to save costs during the short term. Nevertheless, in these insecure work environments, management is encouraging employees to work cooperatively in teams. And continuous improvement remains a basic management policy. This is not what Deming taught, nor is it what the Japanese practice. Now that the dust has settled following the boom of initial American interest in quality management, it is time to revisit Deming's 14 points—the origin of quality management in America.

Key words: cooperation, desirability, holism, Japanese quality management, quality management, variation.

INTRODUCTION

During the 1980s, W. Edwards Deming taught that American companies must produce quality goods and

services and that improved quality would improve productivity. Everyone talked about quality, and American management has integrated the concepts of long-term vision, continuous improvement, and teamwork into its traditional management style. The recovery of its full market share by American automobiles in general, and Ford Motor Company in particular, during the late 1980s, is to a large extent attributed to use of Deming's teachings.

After reaching a peak around 1990–1991, however, many indicators of receding interest in quality began to appear. For example, the number of applications for the Malcolm Baldrige National Quality Award has continuously declined after 1991. Also, based on the *Business Periodical Index*, the number of articles published in 1994 under the category of quality control (which includes quality management) has declined to one-third that of 1990. Are American industries satisfied with the level of quality achieved in their products and services? And what does *long-term view* or *continuous improvement* mean to American management? Although the overall U.S. economy is recovering and doing very well, the trade balance shows a persistent deficit, and the value of the dollar is steadily decreasing. U.S. international competitiveness has obviously weakened.

Conversely, throughout the 45 years since Japan's quality improvement began in 1950 when Deming taught the Japanese how to improve product quality, the Japanese have consistently improved quality without any interruption. They are still competitive while their currency has more than doubled its value in the past 10 years. Isn't quality as vitally important today for U.S. international competitiveness as it was in 1980? Can American industries afford to say that quality management was merely a fad whose day of popularity is gone?

Now that the dust has settled following the initial boom of American interest in quality management and Japanese quality management, it is time to revisit Deming's 14 points. These are the foundation of Deming's quality management philosophy. They are examined in light of business practices in Japan, where quality management was first established and where it has been most widely developed since 1950. Deming's 14 points are summarized in Figure 1.

POINT 1

Create constancy of purpose toward improvement of product and service, with the aim to become competitive and to stay in business, and to provide jobs.

An organization must have a corporate philosophy that describes the values, beliefs, and direction or aim the company is trying to accomplish. The statements should not be short-term goals or specific objectives that may change over time, but they must aim at the optimization of the entire system in the long run. To be competitive, to stay in business, and to provide jobs for years to come, maximizing the system in the long run must be emphasized over maximizing quarterly dividends. That is, the global maximization of a company must be emphasized, not the optimization of an individual unit or the organization's profit center. Basic to the concept of constancy of

Figure 1 Deming's 14 points (Deming 1982).

1. Create constancy of purpose toward improvement of product and service, with the aim to become competitive and to stay in business, and to provide jobs.
2. Adopt a new philosophy. We are in a new economic age. Western management must awaken to the challenge, must learn their responsibilities, and take on leadership for change.
3. Cease dependence on inspection to achieve quality. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.
4. End the practice of awarding business on the basis of price tag. Instead, minimize total cost. Move toward a single supplier for any one item, on a long-term relationship of loyalty and trust.
5. Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs.
6. Institute training on the job.
7. Institute leadership (see point 12). The aim of leadership should be to help people and machines and gadgets to do a better job. Leadership of management is in need of overhaul, as well as leadership of production workers.
8. Drive out fear, so that everyone may work effectively for the company.
9. Break down barriers between departments. People in research, design, sales, and production must work as a team, to foresee problems of production and in use that may be encountered with the product or service.
10. Eliminate slogans, exhortations, and targets for the workforce asking for zero defects and new levels of productivity.
- 11a. Eliminate work standards (quotas) on the factory floor. Substitute leadership.
- 11b. Eliminate management by objective. Eliminate management by numbers, numerical goals. Substitute leadership.
- 12a. Remove barriers that rob the hourly worker of his right to pride of workmanship. The responsibility of supervisors must be changed from sheer numbers to quality.
- 12b. Remove barriers that rob people in management and in engineering of their right to pride of workmanship. This means, *inter alia*, abolishment of the annual or merit rating and of management by objective.
13. Institute a vigorous program of education and self-improvement.
14. Put everybody in the company to work to accomplish the transformation. The transformation is everybody's job.

purpose is that the entirety is more than simply the sum of the individual parts. Maximizing the quarterly rate of return will not lead to the maximization of long-term profit. Oftentimes, it is advantageous to sacrifice short-term profits for the sake of long-run profits. Investing in research and development may require some sacrifice of current dividends, but the benefit in the long run is enormous. Other examples of maximizing the system include spending time and money on educating employees and investing time and money in continuous improvement rather than on quick fixes. Corporate philosophy—the declaration of constancy of purpose—must clearly show what direction is prioritized.

The famous Toyota just-in-time operation is an excellent example of top management's constancy of purpose. As the result of an effort spanning 30 years of continuous gradual improvement to reduce set-up time, Toyota has lowered throughput time in the plant from 15 days to one day (Blackburn 1991). Such achievement results only from a team's incessant pursuit of a desirable condition. Furthermore, as Deming has said, such achievement cannot come about without top management's constancy of purpose in encouraging and supporting the team effort, over time, to continue to reduce cycle time and improve quality.

Top management's constancy of purpose cannot be actualized without maximizing job security for employees. The only employees who can carry out the company's constancy of purpose are those who are satisfied and secure in meeting their own basic needs. Only employees who can actualize constancy of purpose in their own lives can help to do the same for the company.

POINT 2

Adopt a new philosophy. We are in a new economic age. Western management must awaken to the challenge,

must learn their responsibilities, and take on leadership for change.

Deming philosophy cannot be understood in isolation from Japanese business practices or Japanese culture in general. The earlier version of point 2 said, "We are in a new economic age, created by Japan." So, it is meaningful to summarize the differences between American culture and Japanese culture, which form the basis for American and Japanese business practices, and which are also relevant to Deming's 14 points.

Analytic and Holistic Approaches

Yoshida (1989) termed the American approach *analytic* and the Japanese approach *holistic*. The analytic approach takes the position that if each part is perfect, the aggregate of parts—or the whole—should also be perfect. The fundamental assumption of this approach is that if each part is understood very well, then the entirety will also be understood very well. The analytic approach is microscopic in that it focuses on the individual parts rather than on the whole. It seeks to understand the whole by dissecting it into parts. Emphasis on free competition is the key concept of this approach. In free competition theory, if an individual tries to maximize personal gain, society is guided by an invisible hand, and it will work very well.

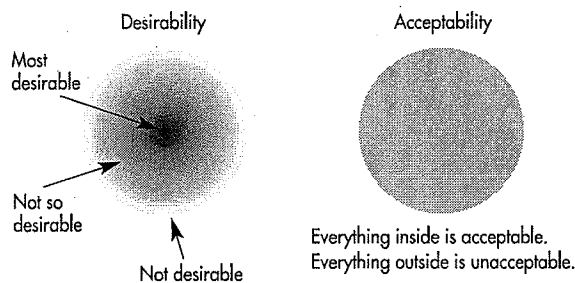
On the other hand, the holistic approach takes the position that even if each part is perfect, the whole may not be perfect. The fundamental assumption of this approach is that the entirety is more than simply the sum of the parts. *Synergism* or *gestalt* might be used to describe this approach. Cooperation and coordination between a government and private industries, among different departments within an organization, or between management and union are encouraged in this approach. Long-term relationships and long-term views are time

dimensions in the holistic approach. Maximizing long-term growth for a company is not obtained by the sum of maximized quarterly dividends.

Desirability and Acceptability Concepts

Concepts of quality also naturally differ due to cultural influences. The Japanese, because of their culture's unified value system, tend to fill in the center first, establishing what is most desirable. Americans, on the other hand, because of the wide variety in their value systems, tend to first specify the perimeter or boundary of what is acceptable (see Figure 2). It is relatively easy to define a center for a wide area, but it is considerably more difficult to define the area's exact perimeter. Furthermore, once rigid boundaries are fixed, people naturally tend to gravitate toward meeting the lower requirements of acceptability rather than striving to achieve the more exacting ones of desirability. In quality, meeting a specification is an acceptability concept, and shooting for a target—continuous improvement—is a desirability concept.

Figure 2 Models of desirability and acceptability.



When Deming's 14 points are categorized into two groups based on these differences of American and Japanese thinking, points 1, 4, 7, 9, 11, 12, and 14 seem to be founded on concepts within holistic thinking, including cooperation, while points 3, 5, 6, and 13 seem to be founded on the concept of desirability. Deming's principles are obviously based on holism, cooperation,

and desirability—totally new approaches that are quite different from traditional American business principles. How, then, do these approaches fit Deming's statistical quality control?

In Figure 3, given distribution A, management's job is to obtain distribution B by reducing the variability and improving the average. To actualize this kind of distribution, cooperation such as helping each other and sharing information is one of the most effective and essential approaches toward reducing variation in any social phenomena. On the other hand, if everyone is encouraged to compete, those above the average will rise even higher and those below the average will go down even lower, widening the variation. The distribution would be dichotomized like that of B in Figure 4. Current American society, as a whole, appears like this with an ever-widening gap between the rich and the poor. From this kind of distribution, it is very difficult to improve the average, for it is moving away from a desirable target. Thus, holism, cooperation, and desirability are very consistent with Deming's belief in quality control as a statistician. Furthermore, holistic thinking, cooperation, and desirability are three principles that led Deming to derive

Figure 3 Reducing variation through cooperation.

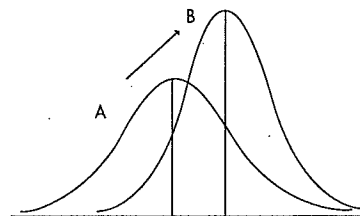
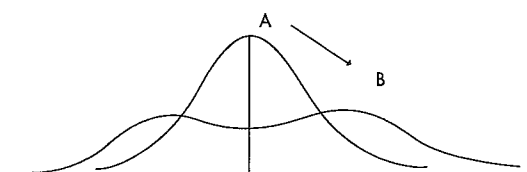


Figure 4 Increasing variation through competition.



his new theory of system optimization, which says that interdependent components must be orchestrated to accomplish the common aim of the system.

Regarding holism and cooperation, Deming especially emphasizes the cooperative relationship between management and employees, which can actually realize the company's aim. During the last 10 years, improving quality has become synonymous with improving consumer satisfaction with American products and services. Besides consumer satisfaction, however, Deming emphasizes employees' job satisfaction, employees' joy of work, and pride of workmanship. This philosophy was also developed by observing the relationship between management and workers in Japanese companies. It is obvious that workers who have no pride in their workmanship cannot make good quality products. Unhappy workers cannot cooperate or help others. Unsatisfied salespersons are not interested in satisfying customers. And customer satisfaction is certainly a barometer of quality efforts in a company. At the same time, however, customer satisfaction can only be realized by satisfied workers.

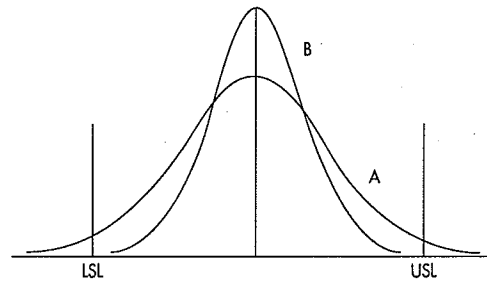
The leader's job is not to evaluate subordinates according to whether they met the given quota. The leadership role is to support, help, and educate subordinates, making them more satisfied in their jobs and happier in their lives in general. It is especially management's responsibility to give employees maximum job security. This is one of the key concepts of Deming's 14 points that has not been accepted or actualized in most American companies. Employees are afraid of evaluation, of their bosses, and especially of losing their jobs at any time. This is one of the primary reasons that quality management efforts have not been successful in many American companies. Management must recognize that improving employee satisfaction is an essential part of quality efforts within a company.

POINT 3

Cease dependence on inspection to achieve quality. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.

Compare the distributions in Figure 5. They share the same kinds of upper and lower specification limits. Is there any need for inspection in distribution B? If distribution B, rather than distribution A, is made from the beginning, the need for inspection is eliminated because all products are meeting the specifications. B is much more of an economical production than is A, which requires inspection. Distribution B should be made in the first place. This is the basic concept for ceasing dependence on inspection to achieve quality. Although this concept is very simple, like the egg of Columbus, it is a fundamental concept for quality.

Figure 5 Cease dependence on inspection.



POINT 4

End the practice of awarding business on the basis of price tag. Instead, minimize total cost. Move toward a single supplier for any one item, on a long-term relationship of loyalty and trust.

How many times have customers had a bad experience by buying the cheapest materials from suppliers? In many cases, whether it is raw material, a part, a product, or service, the cheapest one is the lowest possible quality.

Therefore, do not try to minimize the cost of each part, but try to reduce, or, if possible, minimize the total cost. Think holistically. For example, if a part is a little bit expensive but makes the next stage in the process of manufacturing easier, the total cost will be reduced.

Work cooperatively with suppliers. This means reducing the number of suppliers and, possibly, having one supplier for any one item. In Japanese automobile companies, long-term suppliers are involved with the parent companies from the first day of product development. While the automobile company is designing the car body, suppliers are studying the parts for which they are responsible. In return for stable long-term business relationships with the parent companies, suppliers accept and meet the parent companies' demands for improvement in quality, cost, and delivery (Takamura 1991). In contrast, until the early 1980s, American automobile companies shopped for parts suppliers only when everything about design, production, finance, and marketing was smoothed out internally. The only condition by which suppliers got the job was price competitiveness. Only after suppliers got the job did they start to order new equipment needed to do the job. This difference between Japanese and American practices was partially responsible for the Japanese companies reducing product development time to roughly half the time of that expended by American companies. Japanese automakers did in 30 months what American automakers could do in about 60 months (Risen 1990). Since the early 1980s, when Deming started helping American automobile producers (notably Ford Motor Company), these differences have been gradually eliminated.

Using multiple suppliers creates more variability in supplied parts and their delivery. Just-in-time delivery is considered to be the most economical type of delivery, considering the amount of inventory and work in process.

Although even a single-source supplier has variability in its delivery time, using two or more supply sources makes just-in-time delivery considerably more difficult to achieve. This deviation from the most economical delivery incurs additional costs.

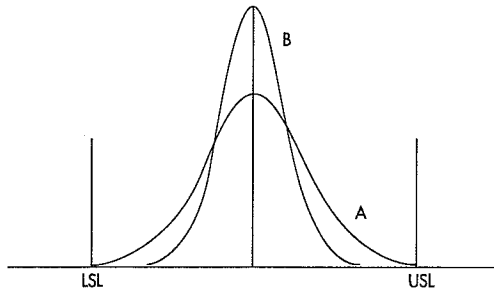
It appears that a company is saving money when it buys from the cheapest supplier after reviewing multiple bids. But the company is often wasting more money due to hidden costs. Remember the company is not buying an individual shipment; instead, it is buying the supplier's production capabilities. Once confidence in a supplier is established, purchasers do not have to inspect daily shipments. Confidence or trust in a supplier, however, cannot be developed overnight. Long-term relationships, by establishing partnerships and business records, are the key.

POINT 5

Improve constantly and forever the system of production and service to improve quality and productivity, and thus constantly decrease costs.

Continuously reduce the variability by shooting for the target value, which is a desirable value. This is the most important concept in quality. A famous Ford Motor Company training film shows the importance of continuous improvement. Somehow Ford's transmission had a warranty problem while Ford's sister company Mazda did not pay out too much on warranty costs. (By the way, Ford has a 25 percent ownership of Mazda.) Ford's engineers were wondering why Mazda's warranty cost was so negligible compared to Ford's. They took a large number of transmissions, disassembled them, measured the dimensions of the parts, and plotted a graph. All of the Ford transmission parts met the specifications, resembling distribution A in Figure 6. But when the engineers looked at the Mazda transmission parts, they found the

Figure 6 Distribution A meets the specification, while B represents better quality.



much narrower distribution, B in Figure 6 (Walton 1986). Meeting the specification is but a minimal requirement. Start from there and then continuously work to improve the process by continuously reducing the variability. This approach involves the concept of desirability, a method of shooting for the target value, which is opposed to the concept of acceptability, the traditional method of merely meeting the specification.

Zero defects is another false concept. Zero defects are impossible in shooting for the target. Zero defects are, however, possible in only meeting the specification. In Figure 6, both distributions satisfy zero defect, but naturally distribution B is much more consistent than distribution A and thus provides better quality. In the concept of desirability, no distribution will ever reach the target value, for continuous improvement has no end.

For continuous improvement to be possible, there must be a learning organization. Thus, there must be a process of learning. The Deming cycle (or Shewhart cycle) provides a process of learning for workplaces. In the learning process of rotating the Deming cycle, one important aspect is that failure is an inevitable part of the process of improvement. If management will not allow workers to rotate the Deming cycle without fear of failure and its penalty, then management should forget about improvement altogether. The precondition for improvement is an environment in which employees can work without fear.

POINT 6

Institute training on the job.

Recruiting Process—Before talking about training, the recruiting process should be discussed. Too often management complains, “Some people are never interested in working hard,” or “Some will never learn.” These statements, however, say more about management hiring procedures than they do about workers. If someone is a lousy worker, why was that person hired in the first place? The solution is to spend more time up front making sure that the person is a hard worker and an eager learner. One certain indicator of these qualities is the applicant’s academic record. Rosenbaum’s (1989) research shows, however, that in American companies’ hiring process, grades are not important, especially for high school graduates. Most employers do not even request their applicants’ transcripts. In contrast, Japanese hiring practices show that most employers hire employees based on their grades and teacher evaluations. The Japanese practice seems to give students a strong incentive to study hard in school. Consequently, their future employers can expect to hire well-educated employees. Certainly, one’s work habit is developed during one’s school days.

Workers Train Workers—One of the problems with workers training workers is that the predecessors do not necessarily want to teach new employees or trainees. In many places lacking job security or a seniority system, the experienced employees have good reason to fear that if they teach new employees the job they have been doing for many years, the experienced employees could be replaced or fired at any time without damage to the company, especially since new employees are typically paid much less than senior staffers. When job security is missing and no seniority system has been established,

experienced employees refusing to train new employees is a natural phenomenon. When the waste of human resources throughout the country from this phenomenon is aggregated, the total loss is enormous, even though the total amount is unknown and unknowable. In Japan, where job security and the seniority system are relatively established, senior employees generally teach junior employees easily. In Japan, if the senior employee does not teach the junior employee who is going to take over the job, he or she might miss the opportunity to learn more advanced skills from another or even gain a promotion.

Training—Workers must be trained in several different jobs. This is not easy to do because of rigid job specifications and different wages for different jobs within American companies. Cross-training is required, however, so that management can assign workers to different jobs during downtime and avoid having to lay off workers. Another reason for cross-training is that workers have more potential than when they have mastered only one skill. Continuous improvement cannot be expected in an environment where human potential is suppressed. By training workers in multiple skills through job rotation, workers can expand their view of the whole process and feel responsibility as a part of the whole (Monden 1991). At Toyota, for instance, every worker is trained in six different jobs. The merit of cross-training is that if a worker makes a mistake, it is highly probable that another worker in the next process will detect and fix it. Also, five cross-trained employees can do the job of six in a team effort if one is absent, although absenteeism is negligible at Toyota (Monden 1991).

Workers especially must know the next process; that is, how the output from their process is going to be used in the next process. A long time ago, when Kaoru Ishikawa (1988) visited one of the steel mills in Japan, he

suggested, "Let's discuss this issue with the people in the previous process and the next process."

The manager of that process asked, "Are we going to discuss issues with our enemy?"

Ishikawa replied, "Do you call the next process your enemy? Your next process is your customer. You must ask them how we are doing our job to please them."

Job rotation is the best way to achieve this perspective. Only when workers can put themselves in the customers' shoes can they see exactly what they have been doing.

Finally, the prerequisites to training must be emphasized; that is, the guaranteed job security and fair distribution of profits in improvement of productivity. Any training aims at improving the quality and productivity of a company's products or service. If improved productivity or efficiency leads to laying off workers, however, no workers will really learn. Walton (1986) quotes Deming, "A company must make it clear that no one will lose his job because of improvement in productivity." Without this clear determination by management, training is a waste of time and money for both management and workers.

POINT 7

Institute leadership (see point 12). The aim of leadership should be to help people and machines and gadgets to do a better job. Leadership of management is in need of overhaul, as well as leadership of production workers.

Manager's Job—A manager should not be a judge but a leader who can help, teach, and coach subordinates to do good jobs. A supervisor who merely evaluates subordinates stands outside the system of subordinates, not inside the system. If the supervisor is in the same system as subordinates, the supervisor should help them before bad results come in because he or she is also a part of the

bad results. Bad performance by subordinates occurs when a supervisor did not or could not provide appropriate guidance. This kind of thinking about a manager's or supervisor's job is totally different from the current traditional thinking. In addition, to be able to help subordinates, supervisors must be knowledgeable of operations. Fresh college graduates without any experience should not be supervisors.

Ranking System—Evaluation often ranks people. In a ranking system, only one person is number one. In a sense, that individual is the only winner. Or the top three may be considered winners and be rewarded within a ranking system. In that case, the rest of the people within the system are considered losers. Even in the most common aspect of all ranking systems, anybody ranked below average is often regarded as a loser. That is, in any organization where there is a ranking system, half of the people are regarded as failures, or losers, because approximately 50 percent will always appear as below average in any ranking system. Ranking systems are supposed to improve individual performance by encouraging competition; however, how can those labeled as below average be motivated to try even harder? Quite simply, ranking systems create failure for as many as 50 percent of the individuals involved.

Suppose a company has a policy of firing the bottom 10 percent of employees every year. How many years does it take such a company to make all employees satisfactory workers so that none need to be fired? The answer is, never! No matter how excellent an organization, 10 percent of the people will always be at the bottom of the scale when such a policy exists. Furthermore, the newly hired 10 percent may be the people who were fired somewhere else. People are constantly changing places, and quality is not improved by those replacements. Resources used for hiring new employees and training them are also enormous. The ranking system is a kind of management

by fear since it causes fear among workers. Management by fear will never work to improve quality and productivity in the long run because it deprives individuals of human dignity. (See point 8).

Understanding Variation—A manager's job is to look at people as a distribution. That is, each person and each person's performance are different from that of others. Therefore, the performance of the total group, as a group, is important for management, not the performance of each person. Remember that even in an excellent group, 50 percent will always be below average. Do not be disturbed by the ups and downs of individuals. Pay extra attention only to both ends of the distribution and leave the others alone. People at the bottom are people who need extra help. That they are at the bottom does not mean that they deserve to be fired. Some may not have learned new skills yet, or they may not know yet what the most desirable output is. Some may have sick children at home, financial trouble, or bad marital situations. Some may be at one of those crisis points in their personal lives that many people go through. The current American business system cuts out people exactly when they need extra help.

People at the top end of the distribution are doing exceptionally well, and the rest of the people in the distribution can benefit by learning from them. Indeed, the ones at the top of the distribution may need a more challenging opportunity to continue doing well. By taking care of these two extremes, management can reduce variability and then improve the average. Ranking is useless and even harmful to all of the rest of the people because people's performance always varies. A leader must understand that variation is always present and that total performance of the group—not the performance of each worker—is important for management. A more detailed discussion of variation is given in point 11.

POINT 8

Drive out fear, so that everyone may work effectively for the company.

A study of 27,871 American workers in 1992 shows that employment and financial stress are their top problems. Without a doubt, the fear of losing one's job is the most fundamental among job-related fears. People lived through this fear for about three years during the most recent recession. During the two years between the beginning of 1991 and the end of 1993, about 4.5 million American workers over age 20 lost their full-time jobs (Koretz 1994). Now that the American economy is drastically improving, the pay for executives is skyrocketing. Workers' wages and benefits, however, have actually been lagging behind the cost of living. To make matters worse, after surviving the recession, even the healthiest companies are cutting employees to save costs in the name of restructuring or downsizing.

Japanese workers would seem to have more job security than U.S. workers, and the societal distribution of wealth would appear to be more even in Japan than it is in the United States. Both of these observations suggest that Japanese workers are fairly free of the most fundamental fear plaguing American workers. Recently, the Japanese automaker Nissan closed one of its main factories in Japan. Nissan retained its policy of no layoffs and acted accordingly. Under this policy, excess employees were transferred to other jobs or factories. While all executives and employees may experience pay cuts, none are laid off or terminated. Everyone suffers, equally sharing the results of hard economic times. Under Japanese corporate policy, a company tries to assume its responsibility for not adding to the unemployed within society. At the same time, the holistic approach within such a policy creates a long-term view. Economically pinched companies try not to cut employees

because they know that if they do, severe labor shortages will occur for them at some time in the future. In this way, even when they must sacrifice productivity for a time, they try to retain their investment for the future.

The typical view from the foreign press about Japan's recent recession seems to be that lifetime employment is "one of the biggest problems facing corporate Japan" (Neff 1993). It is true that lifetime employment makes it difficult for companies to cut costs during downturns. Lifetime employment also makes companies slow to adjust to hard conditions and to renew directions, because they are bound with enormous personnel costs. But, Yoshito Yamaguchi, deputy general manager of international operations at Mitsubishi Electric, claims that the strengths of Japanese companies are lifetime employment, group orientation, and hard work. He believes that the Japanese-style management that worked in the past still works during the current problems (Helm 1993). According to a 1993 survey by the Japanese Productivity Center, 89 percent of responding firms supported lifetime employment in principle (Holley 1994).

Whether or not Japanese management wants these changes, the two basics of Japanese management—lifetime employment and the seniority system—will be forced to change rapidly by conditions that Japan cannot control. These include severe global competition, extremely lower wages available in Southeast Asia, the drastic rise in the value of yen, or more individualism among affluent young Japanese. Japanese management, however, will never easily throw away advantages such as long-term commitment to its employees, securing trained workers, enhancing the psychological stability of workers, emphasizing the solidarity of the entire company, and accenting trust between management and employees.

In America, because of its culturally and historically different background, lifetime employment and the seniority

system may not be practical for improving quality and productivity and may not be wanted by either management or workers. It is management's responsibility, however, to give maximum job security to employees by educating them continuously based on the long-term view. This way they can be assigned to different types of jobs within the company according to the environmental change of the company. At the very least, Americans should not tolerate the sort of management style they witnessed when Boeing announced it was cutting 28,000 jobs, while at the same time giving a \$554,000 bonus to its chairman, raising his salary to more than \$2 million (Balzar 1993). In American companies, employees often seem to be little more than tools used to make the company profitable for the advantage of a mere handful of executives and investors. In today's prevalent American management practices, the concept of company includes managers and stockholders but excludes workers. A company must be an entity that exists for the well-being of all people involved in its operation. This concept is not only basic to Japanese management but the essence of optimization for the Deming system. Efforts to implement Deming philosophy or any TQM or Japanese management style will be useless and fruitless if workers are afraid of losing their jobs at any time.

POINT 9

Break down barriers between departments. People in research, design, sales, and production must work as a team, to foresee problems of production and in use that may be encountered with the product or service.

Ishikawa's statement, "Your next process is your customer," was discussed in point 6. The Japanese did experience problems of barriers between departments, so that the system they developed solves these problems.

In general, when hiring decisions are made within a Japanese company, a college graduate's major has little

importance. Engineering or science graduates and those in other fields (such as business, economics, or law), however, are usually separated into two major groups. A Japanese company does not hire a college graduate as an accounting, marketing, or another kind of specialist, but as a person whose entire educational experience has equipped him or her to be a person who can learn new skills and function well in any new environment. New graduates—be it with bachelor's degrees, master's degrees, or doctorates—are regarded solely as interdependent team players, not as specialists. Moreover, except in a few cases, Japanese universities do not have MBA programs to produce specialists in decision making. This aspect of Japanese hiring practices contrasts sharply with the American practice of hiring MBAs as independent decision makers.

In Japan, after graduating from engineering school, engineers work in factories as blue-collar workers. Even a college graduate works as a door person, front desk clerk, and cashier in Japan's hotel industry. By constant job rotation, college graduates are gradually promoted to management positions. By the time they reach these, they know all other jobs and understand how their positions relate to others in the whole. It is relatively easy for them to understand that no part of their job is done without the help of others in different jobs. Job rotation minimizes sectionalism as a barrier among departments and encourages cooperation among all employees at all levels. In short, by the time college graduates reach management positions, they have acquired the most important component of quality management through job rotation. Nonspecialization and job rotation help to improve communication and cooperation among different sections and divisions within a company.

Cross-functional teams are another device to coordinate activities in several different sections or departments. As discussed in point 4, because of cross-functional

teams, Japanese automobile companies could develop a new car from the conceptual stage to marketplace within 30 months, whereas it used to take about 60 months for the same process in the United States. This achievement was made possible within the Japanese industry by design engineers working together with production engineers and supervisors from the earliest stage. Reduction of automobile development time is achieved purely by cooperation among the many different departments involved. In contrast, each division or department in the typical American corporation operates according to well-defined procedures. Often these autonomous divisions are in competition with each other. In the American automobile industry, this situation has been drastically improved by introducing Japanese-style cross-functional teams. For instance, Chrysler Corporation's recent success is partially due to adopting a model based on Honda's production system (Woodruff 1992).

In his book, Deming (1993) quotes Russel Ackoff as saying that, "If anyone were to assemble the best parts for an automobile, disregarding for every part its price tag and sources, the parts would not make an automobile. They would not form a system." Even in baseball games, there is a system of sacrifice bunt, and the batter is given the credit for it. Is there any device in a typical organization, including corporations, universities, and governments, to reward someone who sacrificed his or her personal or departmental performance for the benefit of the entire system?

POINT 10

Eliminate slogans, exhortations, and targets for the workforce asking for zero defects and new levels of productivity.

Slogans and Targets—Slogans or targets for the workforce, such as the following, usually do not make any difference in workers' performance: Increase the output by 10 percent.

Decrease the cost by 15 percent. Reduce the defect rate by 20 percent. Where did these numbers come from? As will be discussed in point 11, most of the times these numbers are simply picked out of the blue. They have no meaning. Nevertheless, when the target is not met, a penalty is sometimes involved. Management's job is not shouting, but helping and training workers and providing means so that workers can achieve quality work and improve productivity.

Zero Defects—People do make mistakes, and zero defects are impossible in human behavior. Zero defects is an especially wrong concept in continuous improvement, as discussed in point 5. Suppose workers tend to easily make the same mistakes in a production line. If the environment or tools are not changed, simply shouting "Stop making mistakes!" at workers will not reduce the errors at all. If anybody working in the process makes the same mistake, it is management's responsibility and management's problem. And yet it is always the workers who are fired, demoted, or penalized.

Budget—In the budgeting process, funds are allocated to facilitate the necessary activities to accomplish their assigned function in each department or section. These, in turn, are part of the large organizational function or purpose. Therefore, budgeting must be consistent with the overall system optimization of the whole organization, especially with the optimization in long term.

Toward the end of the budgetary period, some departments will naturally have extra money left over and other departments will have shortages. Money should be transferred with the appropriate credit given to the providing department for future usage. Even within the same department, in some years it may have a shortage of money, and in other years it may have excess money. The department also should have credit transfers between different periods.

An important message here is that goals, targets, or budget are all temporary figures simply used as coordinating devices. They should be used neither as rigidly fixed numbers nor as evaluation devices.

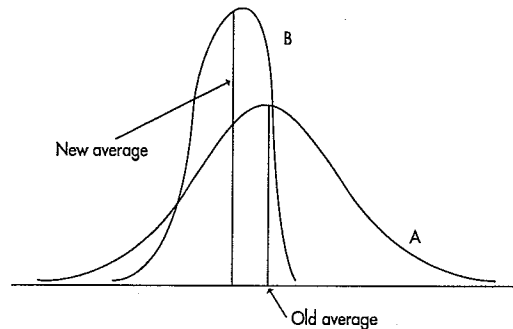
POINT 11A

Eliminate work standards (quota) on the factory floor. Substitute leadership.

Standard as a Single Number—Any company can establish work standards such as these: Produce 100 pieces a day. Make 20 telephone calls an hour. Visit 25 customers a day. What is wrong with these standards or targets? They are most frequently determined based on the average of past performances of all workers doing similar work in that section or department. Naturally, about half of the people do the job better than the average, and the other half performs below the average. Suppose that the distribution of workers looks like A in Figure 7. Notice that not everybody is performing at the average. In other words, an average exists because half of the people are above the average and the other half are below the average.

Once a standard (or quota) is set at the average, those who used to produce more than the average tend to slow down immediately after they reach the quota (or average). On the other hand, those who used to produce less than the average try to do everything to reach the average, including cutting corners and skipping some of the time required for critical procedures. Because of these two forces, the new distribution of the outputs looks like B in Figure 7. Although the variation is smaller, the new average is lower than the old average. A quota lowers the average instead of raising it. Besides, quality is also lower than before, because the quota pressed the people below average to achieve the quota, no matter what. Sometimes they have to let the products go, knowing the right thing was not done. Under these conditions, workers cannot

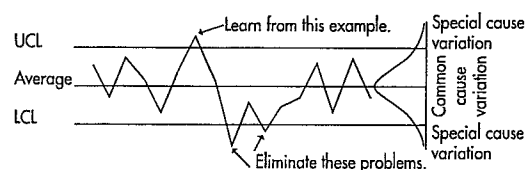
Figure 7 A quota lowers the average instead of raising it.



have pride of workmanship. They feel cheap. Their feelings do not count either.

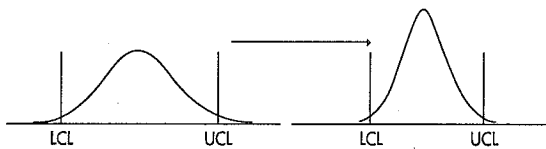
Control Chart—What's wrong with current management practice is that it is trying to represent the entire distribution by one number (average or quota). The entire distribution must be treated as a distribution. Plot everybody's output on a control chart. This enables management to identify those who are outside control limits and thus need extra attention (see Figure 8). Help those who are outside of the lower limit and have others learn from those outside of the upper control limit. By simply doing this, management will be able to reduce the variation and then improve the average. This process is lower management's responsibility. Top management's job is to concentrate on improving the system by reducing common cause variation; that is, any variation within control limits (see Figure 9). The variation within the control limits does not mean any particular worker is incapable or lazy. Everyone is doing his or her best. Variation is there simply because everyone's performance is naturally different. To reduce this kind variation, workers need more training,

Figure 8 Control chart for all workers' output.



more sophisticated machines, more resources, and so on. Improving workers' motivation or job satisfaction is also an essential element in reducing common cause variation. This is top management's responsibility, not workers'. The process of improving the system really requires continuous effort, and this is what management must do to improve productivity and quality. An artificial standard made by management is nonsense. Only the system can control a standard for workers' performance.

Figure 9 Improving the system.



Traditionally, management has analyzed individual outputs or all defective items carefully, but rarely paid attention to the entire process or entire system. This is because individual inputs, outputs, workers, and machines are visible, but the process and system are invisible. A control chart is a device to enable management to see the process and the system. It changes the perspective from an analytical view to a holistic view. When Deming explained a control chart to Japanese managers, they really understood it because holistic thinking is their tradition. This is one of the reasons why Deming's teachings created a revolution in Japan.

POINT 11B

Eliminate management by objective. Eliminate management by numbers, numerical goals. Substitute leadership.

Again, where do numerical goals come from? In many cases, goals are determined by the average of past performances, plus consideration of various expected and unexpected factors and desired results. The only concrete element

here is past data and the others come from just guessing. How could terrorism in the Middle East be forecast as a decisive factor in the price of oil? This is the reason why economic forecasts based on the same past data are not only so different from one another but are also often wrong. That is, a goal is a random variable that has a distribution. But people try to pick up a single number in a distribution as a goal or a forecast. Actualization of the performance is also a result of the process that has distribution. That's why a goal and actual performance never meet.

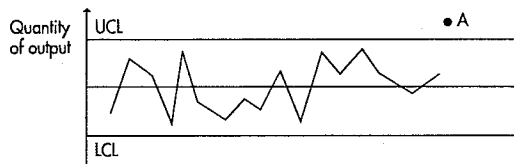
Management by objective (MBO) is management by a single number, without any specified method to achieve that number. "Eliminate management by numbers, numerical goals" does not mean that numbers should not be used. It means, "Eliminate management by *single* numbers such as numerical goals, quotas, targets, and do not punish workers by those numbers." In other words, management by objective must be replaced by management by distribution.

If a process is stable, a goal is not needed. If a process is not stable, any goal is meaningless. The fact that everybody is so different that human performance has a distribution must be accepted. The only way the distribution can be managed is by using a control chart. Management's job is to look at the whole picture and use it to improve the system, while not losing sight of the totality by being distracted or disturbed by individual observation.

POINT 12A

Remove barriers that rob the hourly worker of his right to pride of workmanship. The responsibility of supervisors must be changed from sheer numbers to quality.

Suppose Figure 10 shows the run chart produced by the operating system in a company. A newly assigned manager says of point A in the figure, "We must accomplish this. This is our target." If the system is not changed,

Figure 10 Run chart for a company's operating system.

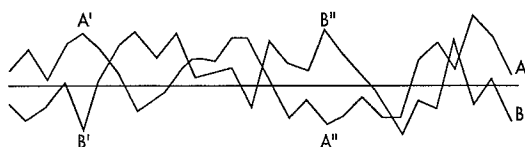
this target will never be accomplished. No matter how hard workers try and no matter how many times a new manager shouts, unless new tools, new skills, or better supplies are provided, it can never be done. Progress cannot be accomplished faster than the speed the system can control.

The only way to achieve unachievable targets or quotas without changing the system is to ship them out at any cost. Workers know that the product is wrong and they should fix it. But because of the quota, they have to let it go. It is management that is hurting the pride of workmanship. Don't assign a number, such as "Produce 100 pieces." Rather improve the system so that workers can produce 100 pieces.

POINT 12B

Remove barriers that rob people in management and in engineering of their right to pride of workmanship. This means, *inter alia*, abolishment of the annual or merit rating and of management by objective.

In Figure 11, suppose A is the record of your performance over 30 years, and B is someone else's. It is impossible to distinguish whose performance is better than the other; however, an annual rating system tries to make a distinction between these two performances by comparing the points

Figure 11 Fictitious performance records.

A' and B' or A'' and B'' at a certain time. In most cases, the difference is statistically insignificant and practically negligible in the long run. A' or B' does not represent a person's true performance but only a single output that changes over time. Generally that's why people are upset and hurt by unfair evaluations. An annual rating system is supposed to improve productivity by encouraging competition among workers. In reality, however, an annual rating system is mainly an apparatus that causes disagreements in evaluation and disputes about salary. It is definitely not the direction to go.

Japanese companies do have an annual rating system, however, it is used to gain a holistic view of individual performance in the long run, almost exactly in the way a control chart is used. If you are at the top end of the distribution for 10 years, you will be promoted to a middle manager or assigned to an important job. If you continue to be much better than the rest of the employees for 20 years, you will be promoted to a senior manager. During these years, however, the extra pay you receive for your high performance may be insignificant, because a major portion of your pay is determined by seniority. If your performance is excellent for 30 years, you will be promoted to an executive position and your pay might jump as much as 100 percent for the first time. After 30 years each individual has different control charts and different distributions. It is relatively easy to make a judgment about which person is the top performer.

In the Japanese seniority system, someone who does not deserve it may be making a lot of money because of age. But everyone is going to get there anyway. There are overestimations and underestimations within such a system, but they cancel each other out over the long run. At least in the Japanese seniority system, managers do not have to spend time and energy on disputes about evaluations and salaries, so they can give their energy to

more productive tasks. Furthermore, the Japanese system liberates workers to some extent from fear of their bosses.

The Japanese pay system may seem unfair to young people who consider themselves very competent. If A in Figure 12 is your performance, and the average performance of others is at the center, people definitely will never fail to distinguish your performance from that of others in the long run. But don't react too quickly. Don't be hasty to judge people on individual data. People's performance has variation. It is always up and down. The difference between people could be statistically insignificant, especially when they have the same educational background. It is better to wait until the difference is clear and the whole picture emerges. Of course, the Japanese system also has drawbacks. In American companies, however, excessive emphasis is put on single observations and instantaneous rewards. Spend more time on deciding who is really more meritorious than others. Don't react on the basis of individual observations, but try to compare individuals' distributions. Try to get a whole picture on a long-term basis.

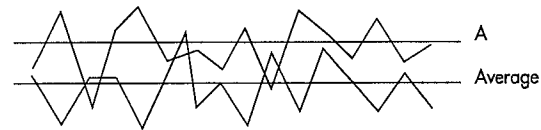
POINT 13

Institute a vigorous program of education and self-improvement.

Any organization must be determined to help its employees grow toward maximizing their potentiality, recognizing that its people are the most important company asset of all. The ultimate objective of education is the improvement of human quality, not the improvement of a company's productivity. This is the fundamental difference between education and training. Improvement of human quality inevitably brings improvement to corporate productivity. This is a very long-term view.

Among various effective means for providing education are the quality control (QC) circles active in most Japanese companies. QC circles aim at improving not

Figure 12 All performance has variation.



only the level of employees' job skills but also the level of their self-actualization. Typically, QC circle members learn basic statistics and problem-solving tools usually called the *seven basic QC tools*. It is reported that, by practicing problem solving using the basic tools through teamwork and autonomous management, workers start feeling that they are very competent and experience the joy of work. This feeling leads to higher satisfaction not only as employees but also as human beings (Yoshida 1993). Unfortunately, QC circle activities often are unsuccessful in American companies. People whose basic human needs, such as job security, are not satisfied cannot strive for higher achievement or challenge themselves to reach for higher goals. American management must realize that its companies lack an environment for nurturing the growth of their employees, and this deficiency causes long-term losses to organizations.

POINT 14

Put everybody in the company to work to accomplish the transformation. The transformation is everybody's job.

Everybody in an organization must be involved in quality management. This is true. This is also the concept of total quality management (TQM) in America. Quality management is not the job solely of inspectors and quality specialists who inspect final outputs and segregate the bad from the good. Also, quality management is not the job solely of the manufacturing department. Quality management is everyone's job from top management to frontline workers in every department of a company. The

closest concept to TQM is what Kaoru Ishikawa calls *companywide quality control*. Deming, however, never used the term TQM. Whenever somebody would use it, he would always ask irritatingly, "What is that? I don't know TQM at all." Deming's management philosophy is not the same as TQM in one crucial difference: In Deming's philosophy it is not enough that everyone gets involved or that everyone is working hard in quality efforts. How everyone and everyone's job is related to others to optimize the whole organization is the most important concept of the Deming philosophy. To put it differently, TQM as practiced in the United States is analytic, and the Deming philosophy is a holistic approach that is most absent within the American business culture.

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