



W. Edwards Deming

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1900-1993

By Myron Tribus

W. Edwards Deming, consultant in statistical studies, the man who transformed the style of Japanese management after World War II and who, thereafter, profoundly affected managerial practices throughout the world, died on December 20, 1993, at the age of ninety-three.

At the time of his election to the National Academy of Engineering in 1983, Dr. Deming was already famous internationally, having been awarded the Second Order Medal of the Sacred Treasure, from the Emperor of Japan, in 1960 for the improvement of quality and the Japanese economy, and the Shewhart Medal from the American Society for Quality Control in 1955. Subsequently, in 1986, he was enshrined in the Science and Technology Hall of Fame in Dayton, Ohio, and in 1987 received the National Medal of Technology from President Ronald Reagan. In 1993 he was awarded the Distinguished Service Award by the National Society of Professional Engineers. He was an honorary life member of the Royal Statistical Society, the American Society for Quality Control, the Biometric Society, the American Society for Testing and Materials, the Union of Japanese Scientists and Engineers, the Japanese Statistical Association, the Deutsche Statistische Gesellschaft, and the American Institute of Industrial Engineers. By the time of his death, he had received sixteen honorary degrees.

Born William Edwards Deming on October 14, 1900, in Sioux City, Iowa, to a family in strained financial conditions, he grew up in Powell, Wyoming, and attended the University of Wyoming in Laramie, where he supported himself by odd jobs as he studied for an engineering degree. After a master's degree in mathematics and physics from the University of Colorado, he was awarded a doctorate in mathematical physics from Yale University in 1928.

Dr. Deming's fame rests on four sets of contributions over a productive career of more than six decades. The first began in 1928, when he received his Ph.D. and began to apply statistical methods in science. In 1934, working with Raymond T. Birge, he published a significant paper on the estimation of errors in physical constants.

The second phase established his reputation as a professional statistician and involved him in the census of 1940. His work generated such interest that he was invited to apply statistical methods to elections in Greece, to national surveys in India, and to census activities in Germany and for the United Nations.

A third phase, which continued for the rest of his life, saw his attention directed toward the improvement of management. It began in 1944, in midst of World War II, when he published his first paper on the implications of statistical process control for managers.

The fourth area of contribution is to the field of economics. Economists have been slow to acknowledge this contribution. Japan was defeated in World War II more thoroughly than any other nation in modern times. Without natural resources, with a very large population on a small amount of tillable land, and without the benefit of conquering armies, Japan has created one of the world's foremost economies. There was nothing in economic theory that would have predicted that Japan would have succeeded. The Japanese, themselves, credit their rise largely to the teachings of W. Edwards Deming, whom they call the "Father of the Third Industrial Revolution." Dr. Deming's work demonstrates that quality, pursued relentlessly, can harness the energies of a people and defy the predictions of economic theorists.

In 1947 and 1950 Dr. Deming was invited by General MacArthur to assist in the first postwar census in Japan. In 1950, acting on the advice of Homer Sarasohn, then on MacArthur's staff in Tokyo, the Japanese Union of Scientists and Engineers (JUSE) invited Dr. Deming to Tokyo to give lectures on statistical process control. His lectures to large numbers of enthusiastic Japanese engineers were transcribed word for word, edited by him, and translated into Japanese. Thousands of copies were sold. When the Japanese offered to pay him royalties, he declined and suggested that they use the money to create a prize for companies that had shown exemplary performance in the improvement of quality. Japanese companies added funds, and today the Deming Prize is regarded around the world as the premier prize for quality. When the U.S. Congress understood the importance of the Deming Prize in Japan as a spur to increased attention to quality, it created the Baldrige Prize in the United States. Other countries are in the process of establishing similar prizes. The modest proposal he made in 1950 in Japan has become a global activity.

When Deming attempted to change managerial practices in the West, he found an enthusiastic response among engineers, but only rejection among managers. Therefore, after he saw the enthusiastic response of Japanese engineers, to guarantee that his work would not be subverted by Japanese management, he insisted that the JUSE arrange a meeting of the leaders of Japanese industry. Eighty of them came. In this lecture Deming told them that if they would follow his proposals to change their managerial style, within five years they would begin to capture a significant share of world markets. They did not believe him, but in the words of one attendee, "Since we did not argue, we would lose face if we did not at least try." Within a month a manufacturer of insulated wire reported a 30 percent increase in productivity. Others also found increases in productivity and quality. Thus was Japan's rebirth begun.

In the West his work in management was ignored. People continued to believe that quality added to cost and that people would not pay extra for quality. Japanese carmakers and electronics manufacturers proved them wrong.

Unable to convince western managers, Dr. Deming was not idle. He continued to work as a statistician. During the period from 1946 until 1980, he published or presented 105 papers on a wide variety of topics: the analysis of election results, the analysis of market surveys, the analysis of birth and death rates, the sampling of bulk materials, accidents with motor vehicles, statistical analysis as legal evidence, the birth and death of newspaper subscriptions, deaf patients of psychiatrists, fertility among schizophrenics, mental health of the deaf, and the use of statistics in the setting of rates for motor freight.

All this changed on June 24, 1980, when NBC broadcast the now-famous documentary entitled "If Japan Can ... Why Can't We?" In this documentary, Dr. Deming appeared briefly, with a few scathing remarks about American managerial practices in production. After seeing the broadcast, American managers, hard hit by competition from Japan, began to call him at his home in Washington, D.C. In 1982 the Center for Advanced Engineering Study at the Massachusetts Institute of Technology (MIT) published his first book on management, *Quality Productivity, and Competitive Position*, and released videotapes in which Dr. Deming discussed his "fourteen obligations of management." In addition, he was invited by MIT and a growing list of sponsors to give a series of seminars on management. These seminars increased in frequency and size, and during the last years of his life, he attracted audiences, including satellite stations, of over 5,000 people at a time and was reaching more than 120,000 people per year. In 1985 he rewrote and retitled his earlier book on management and called it *Out of the Crisis*. Over 250,000 copies of *Out of the Crisis* have been sold. It has been translated into French, Italian, Portuguese, and Spanish. A translation into Dutch is in progress. In the year before his death he published a third book, *The New Economics for Industry, Government, Education*. Over 30,000 copies have been sold.

Deming was at once both kind and generous and harsh and critical. When dealing with workers he was sympathetic. He aimed to put joy back into work. He believed, and produced evidence to back up his judgment, that current managerial

practices robbed workers of the satisfactions so essential to do good work. When dealing with managers he was often scathing and derisive.

An early client in manufacturing in the United States was the Nashua Corporation of New Hampshire. Applying Deming's approach, Nashua began to achieve significant reductions in cost. After the broadcast of "If Japan Can . . . Why Can't We?," the Ford Motor Company called upon Dr. Deming to help. According to Don Petersen, former CEO and board chairman of Ford, Deming's approach was the key to the turnaround in the fortunes of Ford. Waste was reduced, labor relations improved, customer satisfaction increased, and Ford was able to stay in business and compete again. Petersen is unequivocal about the basis for Ford's success: "People want to do a good job. Dr. Deming's ideas and concepts, as we got them going through our system, gave people more and more this feeling that they had a better chance to do a good job. The rate of improvement, in many ways, was much greater than anything we could anticipate."

Deming was scornful of the practices of American managers and of the business schools that taught them. He chronicled these practices in his oft-repeated "fourteen points," his "deadly diseases," and his "profound knowledge." Although in 1980, no business school would acknowledge that Deming had developed a new approach to business, by 1992, two years before his death, he was able to see many schools, even prestigious ones like Chicago's School of Management, adopting his teachings.

His theory of management rests on the four elements of his profound knowledge. (1) *Variability*: All systems exhibit variability and this prevents accurate prediction of the consequences of managerial decisions. Failure to understand the role of variability leads to tampering with a system and can produce a result precisely the opposite of that intended. (2) *Systems*: The second element of Deming's profound knowledge is an ability to understand systems. The practice of dividing the company into separate business "profit centers" is, as Dr. Deming would often say, incompatible with

optimization of the performance of the system as a whole. Dr. Deming insisted that managers look at the entire system of production, including the suppliers and the customers. In his view, the product in the hands of the customer is still in the system. (3) *Psychology*: The third element of his system of profound knowledge is an understanding of psychology. Deming understood that when people find joy in their work, their output rises, they make improvements in what they do, and they remain loyal to their colleagues and to the enterprise. In his list of deadly diseases and his fourteen points, he drew attention to the practices of managers that destroy joy in work, that make workers afraid to tell the truth, and that result in competition when cooperation is needed. (4) *A Theory of Knowledge*: Deming believed that western managers, in general, did not know, and were not taught, a theory of knowledge and, in consequence, did not know how to reason correctly and did not understand the nature of proof, the need for operational definitions, and why there is no true value of anything. This ignorance of profound knowledge, he argued, caused them to lay off people when they should have worked on increasing quality, to be unable to interpret the numbers placed before them, and, worst of all, to be unable to appreciate that the most important costs in any business are unknown and unknowable.

The greatest impact of Deming's teachings are yet to come. Six years ago Mt. Edgumbe High School in Sitka, Alaska, began to apply quality management principles to the operations of the school. Within a few years the effects on the students were so dramatic that the school was besieged with requests for information. Today schools in many parts of the world are attempting the same transformation in their education systems. In the United States, Canada, the United Kingdom, and Argentina, schools are adopting quality methods. Second- and third-grade teachers have shown how quality management approaches applied in the classroom can enhance learning, increase student maturity and responsibility, and at the same time, make learning more enjoyable and more relevant to life. Ann Richards, the governor of Texas, launched a statewide movement to make quality management the central theme in Texas education. Other governors have followed suit.

Dr. Deming's contributions to science, statistics, and economics were important, but his development of a comprehensive theory of management overshadows all else. This theory has already changed the lives of millions of people. Applied to education, it promises to change future generations. Dr. Deming is gone. His legacy lives on.