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THE PRIVATE SECTOR'S EXPERIENCE WITH TOTAL QUALITY MANAGEMENT

U.S. companies are learning that quality pays dividends.

XEROX, THE COMPANY that created the copier industry—the company whose name is synonymous with plain-paper copying—faced a tough challenge during the 1970s. As Japanese copiers of comparable quality and lower price were shipped into North America, Xerox's share of the North American market plunged from 93 percent to 40 percent.

Ford Motor Company was having similar problems. Between 1978 and 1982, its U.S. sales of cars and trucks fell by 49 percent, resulting in a cumulative operating loss of more than \$3 billion.

Around this same time, Milliken & Company—a privately owned textile manufacturer long recognized for quality products and its state-of-the-art technology—began to ask why some of its Japanese competitors achieved higher quality, less waste, greater productivity, and fewer customer

complaints, even though they used technology less advanced than Milliken's. The reasons, company executives found, lay in management approaches and personnel practices that drive improvements in quality and efficiency.

Milliken, Ford, and Xerox have since adopted such practices. The results? Since the early 1980s, Milliken's productivity has increased 42 percent and sales have risen significantly. Between 1981 and 1989, Ford's market share rose from 16.3 percent to 22.4 percent; the company moved from a net loss of \$1 billion to a net profit of \$4 billion. And Xerox has recaptured its leadership in document processing technologies.

These companies' experiences are not unique. In recent years, a number of U.S. companies have found that they could not sufficiently raise their standards of quality by using conventional approaches to managing product and service quality. Instead, like Xerox, Ford, and Milliken, they have adopted a new management approach known as "total quality management" (TQM).

Traditionally, management has sought to ensure quality through inspection at the final stages of production, just before the product or service is

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The problem of foreign dependence in defense-related items does not exist in a vacuum. A central challenge for the United States is to meet military requirements in such a way as to build a stronger, more internationally competitive civilian economy.

approach faces several hurdles: The foreign firms might be unwilling to license their products to domestic manufacturers; the U.S. government might have to pay steep licensing fees; and the domestic firms might not always be able to maintain the desired level of quality.

- The federal government could restrict the import of certain items that are deemed to constitute a threat to national security. Such restrictions are in fact allowed under current law. They have already been placed on antifriction bearings, machine tools, and plastic injection molding machinery. Problems might arise, however, if import restrictions triggered retaliatory protectionist actions by other countries.

Although we have focused on the potential drawbacks of these approaches, options such as these need to be considered in cases where foreign dependencies for critical weapon components are judged to pose unacceptable risks to national security. No one option will make sense in every such case. Instead, the pros and cons need to be considered on a case-by-case basis. To perform such analyses intelligently, however, the federal government needs a much more comprehensive understanding of the extent to which U.S. weapon systems depend on foreign components. This understanding will not be possible until DOD designs and implements an effective information system detailing this dependence, as well as a set of criteria for determining how much foreign dependence can be tolerated in various cases.

The international economy

The problem of foreign dependence in defense-related items does not exist in a vacuum. Because of increasing competition in the global marketplace, the U.S. economy as a whole has come to rely more and more on foreign products, components, and technology. Furthermore, the industrial and technological base of the commercial sector is increasingly important to defense. Particularly as one examines the lower levels of DOD subcontractors, one finds that defense needs are often met by firms that primarily do commercial rather than defense-related work.

Consequently, this country's ability to meet its defense needs is increasingly tied to the strength of the U.S. economy and its ability to

compete internationally. Unfortunately, there are signs that, in the race for world leadership in key technologies, the United States is slipping badly. U.S. industry has often failed to rapidly and effectively commercialize the results of American technological advances by successfully introducing products into the marketplace. Furthermore, out of 12 crucial emerging technologies identified by the Commerce Department and projected to account for nearly \$1 trillion annually in sales on the world market by the year 2000, the United States is expected to lag behind Japan in most cases and behind Europe in several.¹⁹ Most of these emerging technologies are dual-use, having important commercial *and* military applications. These trends do not bode well either for foreign dependencies or for U.S. technological leadership, jobs, and long-term productivity growth.

A central challenge for U.S. policymakers and for U.S. industry is to meet military requirements in such a way as to build a stronger, more internationally competitive civilian economy. Not only will such an economy contribute to the broader aspects of American strength and security, but it will also be better equipped to satisfy this nation's defense needs. •

1. Jacob M. Schlesinger, "Kyocera's Ambivalent Role in Weapons," *Wall Street Journal*, Feb. 5, 1991, p. A-19.

2. In this article, "offshore" or "foreign" source means a source of supply, manufacture, or technology located outside the United States and Canada.

3. Paul Magnusson et al., "American Smart Bombs, Foreign Brains," *Business Week*, March 4, 1991, p. 18.

4. Stuart Auerbach, "U.S. Relied on Foreign-Made Parts for Weapons," *Washington Post*, March 25, 1991, pp. A-1 and A-17.

5. DOD contracts for more than 100 major weapon systems as well as numerous other weapons.

6. Interview with John Tucker, Office of Industrial Resources, Department of Commerce, April 26, 1990; and telephone interview with Brian Nilsson of the same office, April 8, 1991.

7. *A Study of the Effect of Foreign Dependency* by DOD's Joint Logistics Commanders (Feb. 15, 1986). Major portions of this report are classified.

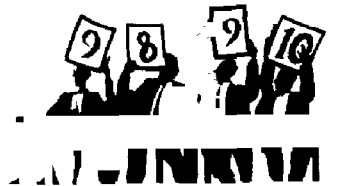
8. *Industrial Base: Significance of DOD's Foreign Dependency* (GAO/NSIAD-91-93, Jan. 10, 1991). This report was issued less than a week before the Gulf War began.

9. Theodore H. Moran, "The Globalization of America's Defense Industries: Managing the Threat of Foreign Dependence," *International Security*, Summer 1990, Vol. 15, No. 1. Also see *A Strategy for Strengthening the National Defense: The Role of Its Industrial Base*, a "draft final" report by the Defense Manufacturing Board Critical Industries Task Force, Jan. 23, 1990; and *Foreign Vulnerability of Critical Industries*, a report by the Analytic Sciences Corporation (TASC), March 1, 1990.

10. U.S. Department of Commerce, Technology Administration, *Emerging Technologies: A Survey of Technical and Economic Opportunities*, Spring 1990.

made available to the customer. This approach, referred to as "inspecting in" quality, puts responsibility in the hands of quality control experts.

The TQM approach, on the other hand, calls for management practices that "build in" quality throughout the process of creating a product or service. Quality then becomes the responsibility not just of quality control experts but of every employee. How quality is defined depends wholly on the customer: A quality product or service is one that always meets the customer's expectations and needs. TQM emphasizes that true quality requires the full involvement of the entire work force and that managers and workers must seek continually to improve the work process. In other words, TQM is not a destination but a journey.



TQM in U.S. corporations

Despite the apparent success of many companies that have implemented TQM, some observers harbor doubts about it. TQM may have been the main driving force behind Japan's economic success over the past several decades; but because it has been most widely applied in Japanese culture, these skeptics say, it is not likely to be effective in an American context. How much weight should such criticisms be given?

GAO recently investigated the impact of TQM practices on the performance of 20 U.S. companies.¹ The results of this study (the first to gather empirical rather than merely anecdotal evidence) showed that the myth about TQM not being applicable in the United States is just that—a myth. Most companies GAO studied experienced an overall improvement in corporate performance. For example, on an average annual basis, these companies had an 11.6 percent drop in customer complaints, a 12 percent reduction in order-processing time, a 10.3 percent decline in defects, and a 16.6 percent increase in the volume of employee suggestions. Overall, the companies boosted their market shares by 13.7 percent.

Essential features of TQM

Total quality management is not a cookbook approach; it cannot be boiled down to a series of clear-cut steps. A company pursuing TQM generally considers the ideas of a number of quality practitioners—particularly W. Edwards Deming, Joseph M. Juran, Armand V. Feigenbaum, and Philip B. Crosby—and then develops a TQM approach that suits its own unique work environment and management problems.

At the same time, TQM is not just a catchall term for any type of management reform. A consensus has emerged as to the essential elements of any TQM approach. Those organizations in GAO's study that experienced improved performance under TQM tended to have implemented most if not all of these elements.

Focus on the customer

Customer satisfaction is critical to competitiveness. Because TQM treats customers as the driving force behind all quality efforts, organizations must determine customers' needs and then must put processes in place to fulfill them.

For instance, in 1984, Goodyear Tire & Rubber established a customer support network based on a toll-free number. USAA Property and Casualty insurance division conducts quarterly customer attitude surveys and evaluates its service delivery against the standard set by L.L. Bean. And the Business Products and Services division of Xerox analyzes a wide variety of data, gathered from monthly surveys of 55,000 Xerox equipment owners, to identify customer requirements. This information is then used to develop concrete business plans for making the necessary improvements. Along with other steps Xerox has taken, this focus on customer satisfaction has contributed to some impressive statistics: Between 1983 and 1989, there was a 38 percent increase in the number of customers for copier/duplication systems who considered themselves "highly satisfied" and a 60 percent decrease in customer complaints.

Active top leadership

The top executive of an organization must provide active leadership if quality is to be established as a fundamental value in the company's management philosophy. In the organizations GAO studied, quality concepts were clearly articulated and thoroughly integrated throughout all organizational activities. Top executives also took the lead in establishing a more flexible and responsive corporate culture to allow for more communication—both

formal and informal—between departments and among workers.

At Milliken, for example, the TQM process began in 1981 when a program called Pursuit of Excellence (POE) was launched by senior management. Today, Roger Milliken, chief executive officer, and Thomas J. Malone, chief operating officer, devote more than half their time to POE. Similarly, Xerox's TQM drive, known as "Leadership Through Quality," was announced in 1981 by then Chief Executive Officer David Kearns. Management has continued to demonstrate leadership through daily practice by frequent communications that keep all Xerox employees informed of the progress of Leadership Through Quality.

Employee involvement and empowerment

In order to strengthen employee commitment to continuous quality improvement, organizations in GAO's study focused on teamwork and on increasing employees' sense of involvement and empowerment. Companies also provided training to ensure that employees had the skills necessary for a TQM approach.

Motorola, for example, encourages first-line employees to make significant on-the-job decisions. To help prepare them for these responsibilities, the company spends more than \$100 million annually on training and education—an effort known as "Motorola University."

At Milliken, teams of workers are a hallmark of the quality process. Production work teams can undertake training, schedule work, and establish individual performance objectives. Moreover, any Milliken employee can halt a production process if

he or she detects a quality or safety problem.

Xerox's approach to quality issues is reflected in the company's concept of "Team Xerox." In 1988, teams in manufacturing and development were credited with saving \$116 million by reducing scrap, tightening production schedules, and devising other quality-enhancing measures. Xerox provides quality training to every employee, and the company gives rewards and recognition for quality improvement efforts not only to individuals but also to groups.

Actions based on facts

Fact-based decision-making is another common feature of TQM. In order to determine when changes are needed, companies use systematic processes to continually measure and evaluate the quality achieved with current production processes. TQM practitioners refer to this as a "Plan-Do-Check-Act" approach to quality improvement.

At Milliken, for example, quality improvement efforts are founded on factual information contained in databases accessible from all Milliken facilities. Xerox has identified its most important business processes and compared its performance in these areas with world-class standards to establish benchmarks. Employees are encouraged to use these benchmarks to assess their work.

Partnership with suppliers

Traditionally, U.S. firms have established minimum specifications for suppliers and then, from the pool that met those minimum standards, chosen the suppliers that offered the lowest prices. Under TQM, many companies instead have estab-

lished closer, long-term partnerships with a smaller number of suppliers who meet higher quality standards. Such suppliers, it is felt, can be enlisted as full partners in an organization's own quality efforts.

In certain cases, companies have included their suppliers in key product design meetings. Some companies have even gone so far as to help suppliers improve their own quality systems. Milliken, for instance, has provided training in quality principles to its suppliers as well as to its own employees. Xerox's suppliers receive training in such areas as statistical process control and total quality techniques. These suppliers credit Xerox with improving their products and operations; over the past five years, the number of defective parts from suppliers has been reduced by 73 percent.

TQM's broad applicability

Although TQM principles were first applied in manufacturing companies, the approach is flexible enough that many different kinds of organizations can benefit from putting it into practice. The private-sector organizations in GAO's study included both manufacturing and service companies (such as insurance, telephone, and catalog sales companies), both large companies and companies with fewer than 500 employees. Companies in every category improved their performance with TQM.

For example, not only did a TQM approach help Corning greatly improve the quality of output in its manufacturing plants, it also spurred improved operations in its corporate tax unit. That unit simply applied the principle of finding out its



customer's needs. In this case, the customer was the Internal Revenue Service, which turned out *not* to want a summary of thousands of accounts detailing the expenses of Corning's various departments. The resulting change in procedure reportedly saved Corning 400 hours of personnel time annually; the IRS also saved the hundreds of hours it had previously spent unraveling the accounts summary.

Motorola had a similar experience in one of its staff offices. The internal audit department achieved a 26 percent increase in audit staff productivity, thereby saving \$1.5 million. In addition, the time required by external auditors to complete their review was cut in half, resulting in a savings of \$1.8 million.

TQM can also yield benefits in the country's largest service organization—the federal government. Many federal executives, managers, and employees have realized the need to do business in a new way and have made a commitment to TQM principles. The potential benefits include billions of dollars in savings, more efficient and effective government, and increased citizen satisfaction with the services they receive.

Reaping the benefits

Wherever TQM is applied, it is crucial that the organization implementing it allow sufficient time for results to be achieved. For the companies in the GAO study, it took anywhere from one to five years for the initial benefits of TQM to be real-

ized; the average was two and a half years. TQM is not a means of improving performance in the short term. It takes time to change a corporate culture, plan new strategies, and train people in new ways of thinking and working. Most importantly, it requires continuous hands-on leadership.

With the right leadership and enough time, the benefits of TQM can be enormous. Not only will individual organizations improve their performance, but the U.S. economy as a whole will be strengthened. TQM's emphasis on quality and customer service can help U.S. private-sector firms to become more competitive in today's international economy and can help government organizations deliver services more efficiently, even in the face of budgetary and other resource constraints. Furthermore, the "second-best" product image that private-sector U.S. firms have had as compared with the Japanese has been helped by improvements in the quality of their performance (rather than by mere polishing of their corporate images). Similarly, the U.S. taxpayers' doubts about their government's ability to serve the needs of its citizens can be alleviated by an improved delivery of services. In other words, TQM can—if truly adopted as a fundamental change in approach—help an organization get the most out of what it has. •

1. See *Management Practices: U.S. Companies Improve Performance Through Quality Efforts* (GAO/NSIAD-91-190, May 2, 1991). GAO studied 20 companies that, in 1988 and 1989, were among the highest-scoring applicants for the Malcolm Baldrige National Quality Award—an award presented annually by the U.S. Department of Commerce's National Institute of Standards and Technology. The award recognizes companies that have successfully implemented total quality management systems.