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## Managing With Technology: The Future of North American Business

*by John A. Roth\**

All participants in this conference would likely agree that North America has developed the world's largest concentration of advanced information technologies. Indeed, its technological development has been staggering. Information-transmission capacity alone has increased at an astonishing rate. A single company can now link together a private telecommunications network which has a greater capacity than the world's public networks in the early 1960's. Today, the capabilities of any hand-held programable calculator far surpass those of the first modern computer which weighed 65,000 pounds, took up 3,000 cubic feet of space, and consumed 160 kilowatts of power. Technological innovations have improved the cost performance ratio of computer operations by thirty-six times in sixteen years. Moreover, computers now can operate about 1,000 times faster than they did some thirty years ago; and, the pace of development continues.

Advanced technologies, such as gallium arsenide, show similar improvements. The number of transistors which can be put on a gallium arsenide chip in a laboratory has increased from fewer than 100 per chip in 1975 to almost 100,000 today. By 1990, that density should increase fivefold. While these all represent tremendous technological advances, it seems that North American business has an inexhaustible appetite for still more technological innovation — namely, for more complexity, at lower costs, and in smaller packages.

But have North Americans reaped the richest rewards from technological breakthroughs? Also, have North Americans really applied these innovations to make our businesses grow?

The answers, I believe, are no — at least not in comparison to our major competitor, Japan. Major North American corporations seem satisfied with 20 or 10 or even 5% annual growth rates. In contrast, the leading Japanese industries plan annual growth rates of 50 to 100%.

The impact of this growth on their GNP has been profound. Only a generation ago, the Japanese economy comprised only 2% of the world economy with output of a little less than that of Italy. On the other hand, the U.S. economy alone made up more than 35% of the world's total.

In only thirty-five years, the Japanese economy has grown to ac-

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\* President, Bell-Northern Research.

count for more than 10% of world gross product — an economy as large as that of West Germany and the United Kingdom combined. As the Japanese economy increased, the U.S. share declined to its current level of a little over 20% of the world economy.

The consequences of this profound change include the shifting the center of world economic activity from the North Atlantic to the Pacific. For the first time in history, U.S. trade across the Pacific is greater than U.S. trade across the Atlantic. The U.S. concurrently is posting record trade deficits. For example, during the last twelve months, the U.S. recorded a \$153 billion imbalance in trade.

The reasons for Japan's emergence and increasing dominance on the world economic stage have been the focus of intense examination and debate. Indeed, a minor industry has developed around the analysis of the many roots and causes of Japan's economic success.

Yet, despite their interest, most North American businesses seem to treat the Japanese business model as some type of oriental alchemy. These industries have only now begun to recognize that Japanese economic success is based on managing technology in the broadest sense. However, they have yet to apply this knowledge.

When it comes to managing businesses North Americans have continued to limit the definition of technology and apply innovation almost exclusively to automation of the manufacturing process. Even worse, new technologies are too often seen as Band-Aids—first aid treatments to patch up assembly lines or superficial applications to cover the basic faults in a manufacturing process. North Americans need to understand that technology is not just software and LSI, it is know-how. Furthermore, it's the task of business leaders to develop and apply know-how throughout our businesses.

Clearly, the Japanese have succeeded because they understand the technology of business better than North Americans. They have not been seduced by the glitter of "gee whiz" manufacturing technologies to the exclusion of everything else.

There is an historical basis for the Japanese focus on understanding the technology of business. North American industries emerged from World War II with a tremendous production capability which was retooled quickly to meet pent-up consumer demand. The economy boomed and corporations prospered, not because they managed growth, but rather due to the prevailing conditions under which they could not fail.

Japan, on the other hand, was forced to manage its way out of the debris of a lost war. The Japanese had no option but to gain a better understanding of the technology of business. They did more than simply cope with reduced resources and tough circumstances. The Japanese went on the offensive. For example, they were first to understand the technology of quality and its role in reducing the total cost of a product

or service. They also recognized the immense price of manufacturing or design mistakes.

Using a variety of techniques, including quality circles, Japanese companies have built in quality from design and manufacture to customer service. They understood that quality can and must be built right into the entire production process. However, North Americans have been slow to learn the technology of quality and we still have yet to apply the lesson which the Japanese learned years ago—that quality is free and reduces costs in all areas of business.

Just-in-time inventory is another Japanese business technology. Pioneered by Toyota, it has spread throughout Japanese industry. Many businesses in North America, however, misinterpret just-in-time inventory as merely a cost-cutting system whereby a supplier stockpiles material until it is needed. Yet, that is not the main objective of just-in-time inventory which allows a factory flexibility to manufacture a wide range of products, and facilitates quick changeovers, more efficient production runs, and lower labor costs. Most importantly, just-in-time inventory know-how reduces overhead.

Why do North Americans lag so far behind the Japanese in developing and applying business know-how? The answer lies in the historical adherence to two different sets of rules. North American business decisions are guided by return on investment as opposed to the Japanese business preoccupation with growth. The fundamental Japanese belief is that if a company grows faster than its competition and captures the major market share, the bottom line ultimately will take care of itself.

Japanese marketing strategy is dissatisfied with 5 or 10% growth rates in a marketplace which is expanding by 25 to 50%. The Japanese will always try to grow faster than the market because they understand that the companies with the major market share will have the best bottom line. They also know that all competitors will ultimately disappear. Expert sources such as the Harvard business school have proffered the same theory, yet North Americans seem content to be the high price, premium product leader who enjoys a comfortable market niche. It is precisely this complacency which explains why North American attempts to compete with the Japanese historically have been riddled with failures.

The demise of the North American C.A.T. scanning business in Japan is a case in point. U.S. firms entered this market with radically advanced, high-priced devices. Japanese companies responded quickly marketing their own scanners. While many of the Japanese products achieved only 60% of the Western equipment's performance capacity, they were priced 40% lower. Within four years, the market share of the North American products plunged from 60% to 16%. Yet another example is the sad, but true, tale of an American lubricating oil company which had cornered a specialized Japanese market with a premium-priced product. Japanese competitors soon introduced an equivalent

product at substantially lower prices. In response, the Western company maintained its high prices, and thus refused to accept a low margin of return. Soon, the firm was forced out of the business.

The typical North American marketing strategy—conceding the so-called commodity business to the competition, while retaining the attractive high-tech, high-margin products—is doomed to failure. A corporation which captures 80% of the total business can design a superior product than one holding only 20% of the market share. The firm holding a dominant market share has the resources and volume to invest in research and development, as well as the capital to create quality products at a lower price.

The low price, high volume Japanese strategy is particularly potent when combined with quality know-how and just-in-time inventory systems. This strategy explains how the Japanese have overcome many short-term technological advantages of their Western competitors.

The competitive growth bias of Japanese companies creates a continuous cycle for investment, introductions of new products, cost reductions, and market share gain. They have embraced technology, not as an end in itself, but as an integral part of this overall business blueprint.

For the Japanese, technology represents a strategic tool. By the end of 1984, they were using over 67,000 industrial robots. That was more than four times the number installed in the U.S. and Canada combined.

The good news for North Americans is that more and more of their businesses are beginning to harness the power and potential of technology. Thousands of companies are spending billions of dollars to integrate high technology with conventional manufacturing. Advanced information technology is being applied to virtually every step in the manufacturing process.

The bad news indicates that manufacturing labor typically accounts for less than 10% of manufacturing costs. Perhaps due to the substantial investments being made in factory automation, North America actually is quite competitive with the Japanese in manufacturing. This may account for the many Japanese factories now being established in the U.S. and Canada.

The central problem concerns white collar office workers who now outnumber blue collar industrial workers 2:1. By the end of this century, that ratio could be as high as 8 or 9:1. More than 80% of all office workers are "knowledge workers" — managers, lawyers, secretaries, and professionals. Their jobs are highly skilled and largely involve information. Research indicates that 40% of their time is spent in searching for, reading, and analyzing information. Also, almost half—a full 46%—of their working hours is spent in meetings, discussions, or communicating that information.

It is axiomatic, then, that the best way to improve productivity of office workers is to help them to communicate better — with each other,

as well as with their customers and clients. Unfortunately, too many companies have been slow to realize the need for comprehensive improvements to their communications systems. Few have committed sufficient resources to meet the changing communications needs of the modern workplace.

Of course, exceptions exist. Most major companies already have applied computer technology to inventory control, customer billing, and credit management. Portable computers link sales personnel to head offices. Corporations provide customer access to databases as a way of securing their loyalty; and computers are used to track and respond to customer complaints.

But this provides only a beginning. Companies which are leading the information revolution have advanced much farther.

In spite of all the technology applied to the North American office, the Japanese achieve four times more sales per knowledge worker. Perhaps the reason for this achievement lies in the superior Japanese understanding of the real role of the knowledge worker. Just as Japanese managers have understood the importance of quality and market share, they have examined their performance as knowledge workers and applied similar discipline to their own efforts.

If North Americans learn from Japanese strategies, they will be in a position both to put pressure on the Japanese market share and protect their own.

One of the major advantages North Americans hold over the Japanese is in telecommunications and office information technology. For example, Bell-Northern Research's (BNR) parent, Northern Telecom, the largest supplier of fully digital telecommunications systems and a world leader in designing information technology, has entered the Japanese market with sales of DMS-10 digital central office switches to Nippon Telegraph and Telephone. BNR also stands in the forefront of applying information technology for its own operations. For instance, a recent study of the company's documentation transfer system showed that design documentation for new products was being passed manually through a series of twenty-one in-baskets. At each stage, the documentation was checked or modified and then routed to the next person for further refinements and action. By applying communications technology and operations know-how to this problem, the number of in-baskets was reduced to just four and the design effort decreased from ten weeks to a few days. By examining the role of our knowledge workers, the designer was provided with a system solution.

The preceding small example underscores the need in North America to create total information systems which integrate information processing and telecommunications. North American knowledge workers already have telephones, photocopiers, microcomputers, mainframes, and databases, but unless all of this equipment can communicate and

interact easily, the overall benefits are limited. Production of fully interactive intelligent machines, linked together in a dynamic network, will provide knowledge workers with virtually instantaneous access to a wide range of powerful information and communications services. This will reduce the iterations in all office processes.

The capability to realize that vision is now available. Northern Telecom has recently introduced its Meridian DV-1, SL-1, and SL-100 integrated services networks. These systems have the capability to link a wide variety of terminals, personal computers, and mainframes using the standard telephone wiring already installed in all offices. Users can create, send, receive, and share text, graphics, and voice messages interchangeably. Besides adding voice annotations to any document, users can leave either a written or recorded message should a party telephoned not be available. The Meridian system also allows users to create, fill out, sign, and route office documents electronically. It contains enough computing power to support word processing, personal calendars, an electronic telephone directory, and database management.

In sum, Meridian exemplifies the integrated information systems which are the key to office productivity. Its ability to carry voice, text, data, and graphics simultaneously not only will reduce the time that knowledge workers spend communicating, but also will improve the quality and reliability of that communication.

Clearly, North Americans must focus on improving knowledge worker technology. Advances in silicon technology are enabling the industry to put more than one million transistors on a single chip this year. That represents a tenfold increase in six years. Had the same effort been applied to knowledge workers, North Americans would be able to make legal rulings in milliseconds.

Advanced information technology is readily available and easily accessible. Yet, despite all the talk about the so-called information age in North America, most computers still operate just as workhorses — churning out payrolls, reports, and numerical analysis. The pressing question is how much effort does North American management really expend in improving office productivity with integrated terminals, on-line databases, portable computers, and a host of other innovative information systems?

In North America today, an urgent need exists for business leaders to become students of business management, and to invest energy in understanding how to manage corporations in an era of increasing global competition. We need managers who have been trained as aggressive masters of business technology, not just as business administrators. This new breed of managers combine business dynamics know-how with the knowledge of how to apply advanced technologies to business tasks.

The issue for North American business is not whether to invest in new technology, but, rather, how to apply the benefits of that technology

in every part of the industry. Leading North American companies are recognizing the immense benefits of integrating telecommunications and information technology into their businesses. General Motors provides, perhaps, the best example. While General Motors' business is automotive products, it has recognized the need to gain control of its system of information management. Through the acquisition of Electronic Data Systems (EDS Corporation) and in concert with various telephone companies, GM is building a large and very powerful network to move its information.

North America's position in the global economy depends on how aggressively we can manage new technologies. Companies which integrate advanced technologies into their operations will reduce their costs. They will achieve consistently higher levels of quality, and also acquire the flexibility to adapt to and even profit from shifts in the marketplace. In short, they will become world-class competitors. North Americans can compete in the global economy—if they learn to apply the technology that they themselves have created. Their first priority must be to meet this challenge.

