Figure 11.4a. COSTS OF POOR QUALITY AND PRODUCTIVITY: An Introductory U.S. Perspective

An editorial in *Science* [**248**(#4952): 125 (13 April, 1990)], reprinted below, introduces the following ideas:

∗ the ability to compete in the global economic system is a matter of *national* concern for any country;

∗ the causes are *wide-ranging* for the difficulties faced by industry in countries like the U.S. and Canada which, traditionally, have been dominant economic powers;

∗ the editorial is concerned primarily with *manufacturing*, but similar considerations apply to *service* industries.

The Lost U.S. Excellence in Manufacturing

Americans are accustomed to thinking of their country as leading the world in technology. But when they do, they are living in a dream world. "American manufacturing has never been in more trouble than it is now." The quotation is the first sentence of a report issued by the Office of Technology Assessment (OTA) detailing factors contributing to a continuing decline in U.S. manufacturing capabilities.*

The toughest challenge in manufacturing technology is coming from the Far East. Korea and Taiwan are newly strong competitors. But Japan's record is unique. It has led all major countries in productivity growth for decades. It has become preeminent in important industries that were once dominated by Americans. The Japanese success is attributable largely to great competence in manufacturing technology. They have been alert to opportunities to improve existing products and have made the necessary capital investments to create or obtain superior production equipment. They have been skilled in using equipment, organizing work, and managing people to make the products.

The United States has most of the world's best universities and some of the best industrial laboratories. It ex'cels at making scientific and technical discoveries. But foreign companies and especially the Japanese have repeatedly beaten U.S. firms in getting new and improved versions of products to market while keeping quality high.

The reasons for inferior performance in the United States are many, and they are described in the OTA report. Weaknesses include deficiencies in capital markets, labour, government, and management. A major deterrent to essential investments in technology and equipment is very high U.S. capital costs. To obtain funds necessary to meet federal budget deficits requires high interest rates. Correspondingly, the rates for industrial capital investments are even higher. The behaviour of financial markets has also been detrimental. Pressures are exerted on companies by the stock market, particularly by institutional investors and takeover raiders. For many companies the most important future consideration is the bottom line for the next quarterly report.

Educational deficiencies constitute another handicap for Ameican companies. On the earlier production lines, the workers used their hands, not their heads. But needs have changed. Workers who cannot cope with math or problem-solving are a liability in advanced manufacturing. In the 1960s our students performed in math as well as students anywhere, but now the performance is comparatively mediocre.

Future excellence in manufacturing technology is likely to be dependent on applications of microelectronics. In this fast-moving field leadership in using the best in new capital equipment is usually decisive. In the past two decades U.S. industry has become steadily more dependent on foreign manufacturers for the production machinery. Japanese suppliers dominate the market for computer numerically controlled machine tools. American producers of semiconductor production equipment are fast losing the lead to Japanese rivals. Ten years ago, U.S. firms held more than three-quarters of the world market for semiconductor production equipment. By 1988, the U.S. share was down to 47% and dropping. Losses in the status of the U.S. equipment are a handicap for U.S. semiconductor producers. For some critical production equipment, U.S. users say they can only buy the latest model from Japan after it has been in wide use by Japanese producers for months.

Producers of supercomputers in the United States also risk depen'dence on Japanese suppliers of components. The highest performance memory and biofocal logic components come only from Japan. Cray, a U.S. manufacturer of supercomputers, has at times been told that the latest and best of these components are "not yet available for export from Japan." They are, however, available to Japanese supercomputer manufacturers, and the resultant Japanese supercomputers are ready for export.

Japanese skills in improving technology, in production, and in marketing are admirable. But often they engage in forms of economic warfare that have weakened this country. The United States must take steps to improve its skills and to avoid overdependence on crucial items from others. –PHILIP H. ABELSON

*Office of Technology Assessment, *Making Things Better: Competing in Manufacturing* (Government Printing Office, Washington, D.C., February, 1990).

1 List the factors mentioned in the editorial (regarding manufacturing technology) as being responsible for:
- Japan's success;
- America's inferior performance.

2 What does the editorial say about the role of the *educational* system in:
- the problems faced by industry in countries like Canada and the U.S.;
- the *solution* to these problems?

The two shorter quotations or articles given overleaf on page 11.18 are concerned with the same topic as the *Science* editorial reprinted above, but they refer explicitly to the following matters:

∗ use of *statistical methods* by the Japanese as .... *a major reason for their competitive edge in high-quality low-cost products.*

∗ Japanese auto factories in the U.S. (which use *American* workers) produce a higher-quality car at a lower cost than do General Motors, Ford and Chrysler.

(*continued overleaf*)

In an article entitled *The Scientific Context of Quality Improvement: A look at the use of scientific method in quality improvement*, George E.P. Box and Soren Bisgaard (in *Quality Progress*-, June, 1987, pages 54, 56) anticipated themes of the *Science* editorial reprinted overleaf on page 11.17 when they wrote:

The United States is facing a serious economic problem. Its role as the world's most powerful industrial nation is being threatened. Automobiles, cameras, colour television, computer chips, and machine tools are just some of the product categories in which the U.S. has lost at least 50% of its market to Japan over the last ten years. It's clear that the Japanese are doing a number of things rght, but a major reason for their competitive edge in high-quality, low-cost products is that they use statistical methods. Quite simply, the Japanese have a secret ingredient: they do it and we don't.

Later in the article, Box and Bisgaard comment as follows about whether Japanese methods of production can be applied successfully in North America:

Does it Work in the U.S.?

People often ask, "Will this work in the U.S.?" One interesting example is Matsushita, a Japanese manufacturer of television sets and other electronic devices, which some years ago bought an American television plant just outside Chicago. When Japanese management first took over, the reject rate was 146%. That may sound extraordinary; it means that most television sets were pulled off the line to be repaired at least once – and some were pulled off twice. By using tools like the ones described above (*i.e.*, in Box and Bisgaard's article), the reject rate was brought down to 2%. The change did not happen overnight. It took four or five years of meticulously weeding out the causes of defects. However, when a study group from the University of Wisconsin, led by the late Professor William G. Hunter, visited the plant in the spring of 1985, there was not a Japanese in sight. Only Americans were employed, and there seemed to be no question they preferred the new system. The managers said that the plant was a madhouse before. They could not find any time to manage because they were always putting out fires. The changes had dramatically improved product quality, productivity, and morale – and the managers got time to manage.

EM9031 Globe and Mail, March 24, 1990, page B5

Japanese cars better, top GM official admits

Reuter
MORAINE, Ohio

A General Motors Corp. executive has publicly stated what industry officials have long been loathe to admit: Japanese auto companies make better cars in the United States than their U.S. counterparts.

"The evidence so far is that on average the (Japanese) transplants produce a higher-quality car at a lower cost than the domestic makers." said George Eads, GM's chief economist.

"Transplant" is a term used to describe Japanese auto factories in the United States.

Mr. Eads said Japanese gains in U.S. auto sales "will only stop increasing when the American firms match the Japanese firms."

His statement, made during a lecture series in Moraine this week, was a rare public admission by a GM official that the company and its Detroit-based counterparts, Ford Motor Co. and Chrysler Corp., lag the Japanese in quality.

Officials of the Big Three U.S. auto makers, when questioned privately about Japan's growing success in the United States, have said they are behind their Japanese competitors but are closing the "quality gap."

But Mr. Eads' statement brings the admission into the public arena.

He said there is evidence the quality gap is closing, but said as long as it exists, sales will continue to be lost to the Japanese producing domestically.

"As long as the gap does exist, it will be possible for Japanese firms ..... to profitably establish here and capture any growth in the market or displace domestics," he said.

3 What characteristics of a *product* (either goods *or* services), in addition to high quality, are usually needed for commercial success? Explain briefly.

4 Besides *statistical methods*, what subjects, covered in courses offered *out*side our Faculty of Mathematics, are relevant to the resolution of the difficulties faced by industry in countries like Canada and the U.S.? Explain briefly.

5 Explain briefly the meaning of the statement near the end of the second quotation above at the left from Box and Bisgaard: *(The managers) could not find any time to manage because they were always putting out fires.*

- Outline what you see as the (undesirable) *consequences* of this state of affairs.