

### Illustration 3.1 Optimal Product Quality

An important managerial decision is how much should be spent on improvements in product quality. Certainly the firm's customers value quality, so quality improvements would probably increase sales and revenue. But quality improvements and quality control also cost money. So what should a firm do about quality?

*The Wall Street Journal* reported what one large electronics firm, Hewlett-Packard, did to improve product quality.\* John A. Young, the chief executive officer of Hewlett-Packard, related his firm's experience when it undertook an analysis of product quality in the early 1980s. To their surprise, they found that 25 percent of all manufacturing assets were being tied up in reacting to quality problems. They also found that production costs and prices were being driven up because of these quality problems, which caused Hewlett-Packard to be less competitive than they could have been.

A series of improvements and controls were undertaken, which included an extensive training program, competition and rewards for improved quality, and improved methods for spreading information. The firm set up a computer system to monitor quality and emphasized increased inspection. The company substantially increased the resources devoted to quality improvements and control.

The results were impressive. Within a short time, tangible improvements were becoming evident. For example, the cost of service and repair of desktop computers was reduced by 35 percent. For other products, production time fell as much as 30 percent, with product defects declining substantially. These improvements allowed Hewlett-Packard to cut prices on many products. The quality program also permitted the company to reduce inventories from 20.2 percent of sales to 15.5 percent within two years. This decrease meant a saving of \$200 million that did not have to be tied up in inventories.

The improved product quality had other benefits such as reduced repair and services, lower inventory costs, and decreased manufacturing costs. Even more important, when production costs fell, prices were reduced and sales increased. Moreover, the reputation for high quality can stimulate business. In an industry such as the microcomputer industry, all of these factors increase revenues. But improved quality also costs something. The measures set up by Hewlett-Packard certainly cost the firm money. The new computers, the added inspectors, and the added expenses for training added to costs.

Hewlett-Packard's decisions did enhance the profitability of the firm. The management decision to invest resources in quality control was correct. Whether or not the firm invested the *optimal* amount remains uncertain. Did the last \$1 spent on product quality return more than 1\$ in increased revenues and reduced costs? If so, Hewlett-Packard should spend still more on quality assurance. Or did the last \$1 spent on product quality return less than \$1? If this were the case, Hewlett-Packard would have spent too much on quality.

The original proponent of quality control was probably Walter Shewhart of Bell Laboratories who was the first to use statistics to control manufacturing quality during the 1920s. The man behind the current movement toward improved product quality in U.S.

manufacturing is W. Edwards Deming, an American statistician who played a prominent role in transforming Japanese manufacturing into the symbol of high quality after World War II. *Business Week*\*\* reports that Deming looks for quality in all aspects of business from the floor of the factory, to methods of sale, and to management's treatment of labor.

It is not surprising that "the cranky old man (who) has come to symbolize the current quality movement" believes *limiting* defects is not enough, but rather the goal must be to eliminate them. While Deming's zest for perfection is laudable, no firm is likely to find zero defects to be optimal. Marginal costs of eliminating defects will equal the marginal benefits well before the probability of producing a defective product is reduced to zero.

\* "One Company's Quest for Improved Quality," *The Wall Street Journal*, July 25, 1983.

\*\* John A. Byrne, "The Prophet of Quality," *Business Week*, January 28, 1991.