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# Quality Management, Statistical Process Control, and Six-Sigma Capability

Many production and service processes suffer from quality problems. Airlines lose baggage, computer manufacturers ship laptops with defective disk drives, pharmacies distribute wrong medications to patients, and postal services lose or misdeliver articles by mail. In addition to these quality problems directly visible to consumers, many quality problems remain hidden from the perspective of the consumer, as they are detected and corrected within the boundaries of the process. For example, products arriving at the end of an assembly process might not pass final inspection, requiring that components be disassembled, reworked, and put together again. Although hidden to the consumer, such quality problems have a profound impact on the economics of business processes.

The main purpose of this chapter is to understand quality problems and to improve business processes with respect to quality. We will do this in five steps:

1. We first introduce the methodology of statistical process control, a powerful method that allows an organization to detect quality problems and to measure the effectiveness of process improvement efforts.
2. We introduce various ways to measure the capability of a process, including the concept of six sigma.
3. One way to achieve a high process capability is to build a process that is sufficiently robust so that deviations from the desired process behavior do not automatically lead to defects.
4. We then discuss how quality problems impact the process flow, thereby extending the process analysis discussion we started in Chapters 3 and 4. Specifically, we analyze how quality problems affect flow rate as well as the location of the bottleneck.
5. We conclude this chapter with a brief description of how to organize and implement quality improvement projects using structured problem-solving techniques.