

Chapter 8

Variability and Its Impact on Process Performance: Waiting Time Problems

For consumers, one of the most visible—and probably annoying—forms of supply–demand mismatches is waiting time. As consumers, we seem to spend a significant portion of our life waiting in line, be it in physical lines (supermarkets, check-in at airports) or in “virtual” lines (listening to music in a call center, waiting for a response e-mail).

It is important to distinguish between different types of waiting time:

- Waiting time predictably occurs when the expected demand rate exceeds the expected supply rate for some limited period of time. This happens especially in cases of constant capacity levels and demand that exhibits seasonality. This leads to implied utilization levels of over 100 percent for some time period. Queues forming at the gate of an airport after the flight is announced are an example of such queues.

- As we will see in the next section, in the presence of variability, queues also can arise if the implied utilization is below 100 percent. Such queues can thereby be fully attributed to the presence of variability, as there exists, on average, enough capacity to meet demand.

While the difference between these two types of waiting time probably does not matter much to the customer, it is of great importance from the perspective of operations management. The root cause for the first type of waiting time is a capacity problem; variability is only a secondary effect. Thus, when analyzing this type of a problem, we first should use the tools outlined in Chapters 3, 4, and 7 instead of focusing on variability.

The root cause of the second type of waiting time is variability. This makes waiting time unpredictable, both from the perspective of the customer as well as from the perspective of the operation. Sometimes, it is the customer (demand) waiting for service (supply) and, sometimes, it is the other way around. Demand just never seems to match supply in these settings.

Analyzing waiting times and linking these waiting times to variability require the introduction of new analytical tools, which we present in this chapter. We will discuss the tools for analyzing waiting times based on the example of An-ser Services, a call-center operation in