Delight Your Customers the Six Sigma Way

By Sanjaya Kumar Saxena

All customers value consistent and predictable services and products with near zero defects. The trick for providers is figuring out precisely what this means in terms of everyday processes and performance levels. People often view Six Sigma as a rigorous statistical quality control mechanism that reduces defects to 3.4 in a million opportunities. Rather, it can more broadly be thought of as a way of using statistics to understand customer needs better and to manage business processes to meet those needs.

Translating customer expectations and experiences into a language of numbers is the first step in measuring and improving our processes. In statistical terms, customers expect the **mean**, or our target for performance. Mean is also referred to as the arithmetic "average" in common language. What customers actually experience, however, is known as **variation** from the mean. For example, how often do we notice timely delivery from a thirty-minute pizza delivery shop? In contrast, we always take note of delayed deliveries, or that shop's variation.

If we can measure process variations that cause **defects**, defined as unacceptable deviation from the mean or target, we can work towards systematically managing variation to eliminate those defects. Six Sigma provides a methodology to achieve this.

What Is Six Sigma?

Sigma is a Greek letter represented by the symbol **σ**. Why "Six Sigma" and not Four or Five Sigma or Eight Alpha (another Greek symbol)?

Sigma is a statistical term that measures deviation from the process mean or target. The figure of six was determined statistically by looking at the current average performance levels of most business enterprises. We would like to revise this figure to eight or maybe nine, provided the world becomes a more orderly and predictable (even with increasing entropy or chaos) place to live!

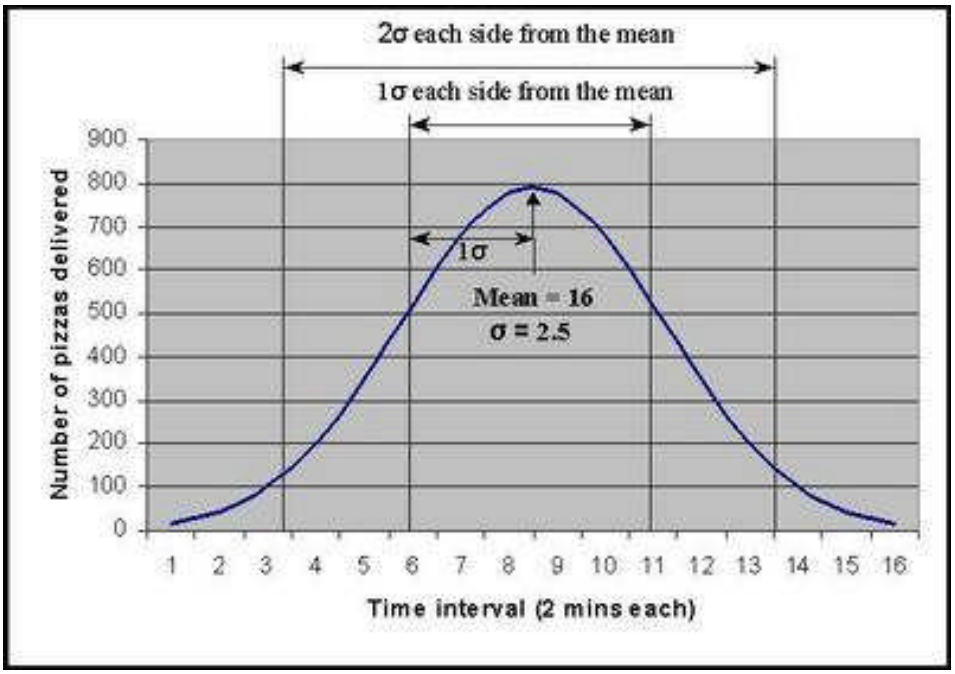
Example

Consider a pizza delivery shop that guarantees delivery within thirty minutes from the time of accepting an order. In the event of a delivery time miss, the customer receives a 100% refund. Management set a target (mean) of delivering every pizza order within fifteen minutes and aligned its processes to meet this goal.

If we collect data of actual delivery times over a large number of deliveries made by the pizza shop, we can place that data in a frequency table. This table would list different time intervals (called classes), such as “0 to 2 minutes,” “2 to 4 minutes,” “14 to 16 minutes,” up to “28 to 30 minutes,” and would show the count of the deliveries made in each interval.

Analysis of our data table shows the mean to be 16 minutes. We can also determine that **standard deviation** (the measure of deviation or dispersion in data), or **σ,** is 2.5 minutes. Figure 1 presents a graph drawn from the data of more than 5,000 deliveries recorded in our frequency distribution table. Note that this is not a real graph and is used only for illustration purposes.

Figure 1 Frequency distribution graph for pizza delivery times



This bell-shaped curve is called “standard normal distribution” in statistical terms. In real life, many frequency distributions follow normal distribution, as is the case in the pizza delivery times. Natural variations cause such a distribution or deviation.

Note the following characteristics of this distribution:

- 68% of the data points fall within the area of -1σ and +1σ on either side of the mean.
- Approximately 95.5% fall within 2σ on either side.
- Almost 99.7% fall within 3σ on either side.

A more peaked curve indicates lower variation or a more mature and capable process – in other words, more deliveries made on target. A flatter bell curve indicates higher variation or a less mature or capable process – fewer deliveries made on target.

After this statistical detour, let us come back more solidly to the pizza delivery shop in our example:

- If the shop delivers 68% of its pizza orders on time, we call it a "one sigma shop."
- If the pizza shop makes 95.5% deliveries on time, we call it a "two sigma shop."
- In our example, data suggest that this shop is almost a "three sigma shop." Actually it is a little better than that because a defect is a delivery that takes more than 30 minutes. In other words, from the perspective of defect reduction, our focus is on the area right to the mean in the frequency distribution graph and not on the left portion. (Anyways, the shop can not supply pizza before it is ordered!)

We should now be able to appreciate why management took a delivery time target of 15 minutes and not 30 minutes. Imagine what would have happened with a 30-minute delivery time target!

A Little More Vocabulary

Pizza delivery time is important from the customer perspective and has a significant impact on profits. In addition, it is an entry barrier for the competition. Such a customer requirement is called a **critical to quality (CTQ)** parameter.

For our pizza shop, we can define this CTQ as follows:

- CTQ name: timely pizza delivery
- CTQ measure: time in minutes
- CTQ specification: delivery within 30 minutes from the order acceptance time

Now we can also more easily and specifically define a defect for our shop:

- Defect: delivery that takes longer than 30 minutes
- Unit: order
- Opportunity: 1 per order (that is, only "1" defect can occur in "1" order)

Defining the remaining CTQs and defects will complete the picture. This information will then become the foundation of a focused and effective process improvement effort. Using Six Sigma, the pizza delivery shop has a clearer idea of what constitutes "consistent and predictable services" and "few defects" from the point of view of delighting the customer.

Technical Note: This discussion does not include the 1.5σ process shift. For an introductory discussion of this concept, see the Six Sigma Forum beginner article "Stats and Subjectivity."

About the Author

Sanjaya Kumar Saxena has more than twenty-two years of experience in the software industry, including extensive experience with business process management and information security. He holds a bachelor's of technology in electrical engineering, has served as guest faculty at premier Indian management institutes, and authors *Discover Six Sigma*, a blog to support the application of Six Sigma in different business environments. A member of IEEE, Sanjaya works for Pre-emptive Systems (P) Limited.