

Statistical Process Control (supplement to Chapter 11)

In business, statistical tests are rarely performed in the way we do them in class.

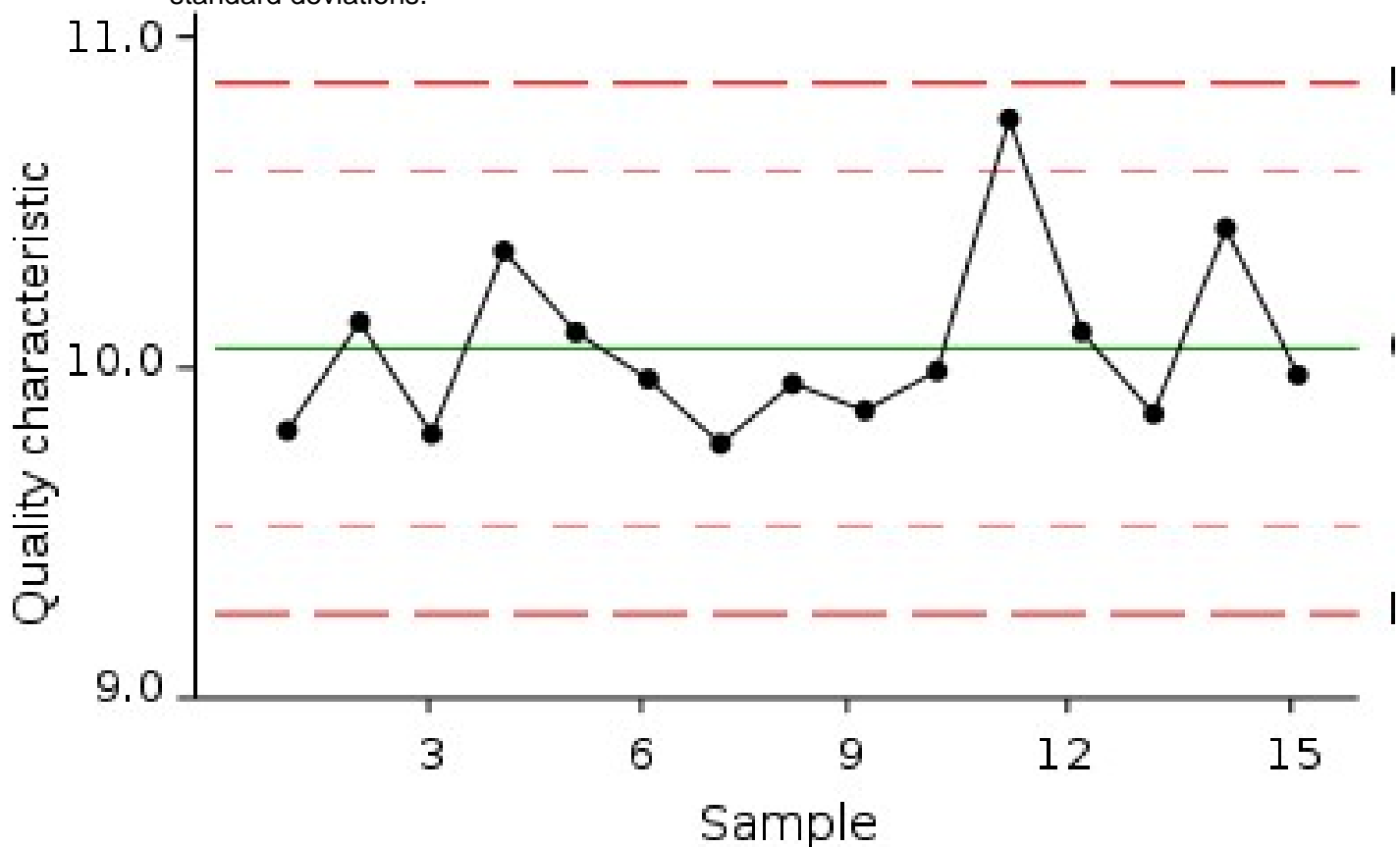
- It would be time-consuming and costly to calculate values of t , z , or X^2 each time we wanted to check the status of something.

Instead, in most business settings, a process called **Statistical Process Control** is used.

- The methods were perfected by lowan William Edwards Deming in the 1950s.
- After World War II, the U.S. State Department sent Deming to Japan to assist Japanese industry in recovering after the war.
- His methods were applied by companies like Mitsubishi, Honda, Toyota, Sanyo, and Sony—leading to the rise of Japanese industry in the world.
- American and European companies started applying these methods in the 1980s and '90s.

In most cases, statistical process control involves keeping track of sample data over time on a **control chart**.

- These use the idea that every process will vary to some extent.
- The key is to see when it is **out of control**.
- There are many types of control charts, but the majority are centered on the mean and marked off with standard deviations.



Control charts are often shaded to indicate the easiest method of interpretation:

- Often the middle area (between -1 and 1 S.D.) is shaded green—meaning things are O.K.
 - There may be some variation, but it's not enough to worry about.
- The areas between 1 and 2 and -1 and -2 are often shaded yellow—meaning careful observation is necessary.
 - A potential problem may occur, but no adjustment is needed yet.

- The areas beyond -2 and 2 are often shaded red—meaning the process is out of control and adjustments need to be made.
 - This is equivalent to a significant result on a statistical test.

There are other things that can indicate an out of control process as well:

- The most common is a long run of data (10 – 12 in a row) on the same side of the mean.
- Another is a short run of data (3 – 5 in a row) in the “yellow” zone.

Control charts can be used for

- Quality control (in both manufacturing & services)
- Correct allotment of materials
- Efficient distribution of personnel
- Efficient use of time on different projects
- Recognizing any pattern that might indicate a problem

- Recognizing superior performance of any sort (being “out of control” in a positive way)

In addition to being marked off with standard deviations, sometimes control charts are marked off with the numbers that produce various results on a statistical test.

- In this case, the “green/yellow” boundary is often a result that would produce a result at the 10% level of significance.
- The “yellow/red” boundary is often a result that would produce a result at either the 5% or 1% level of significance.