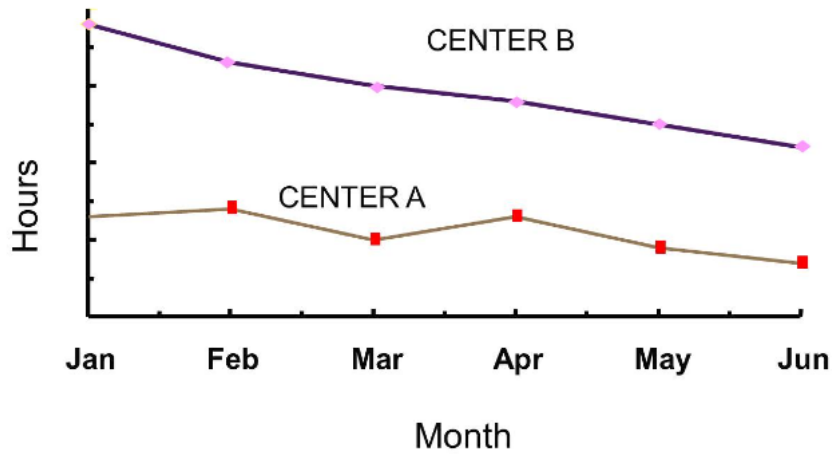# Graphs and Charts

Key Learning Points

1. Describe the importance of Graphs and Charts.

2. Explain how to build Graphs and Charts.

3. Utilize Graphs and Charts in improvement projects.
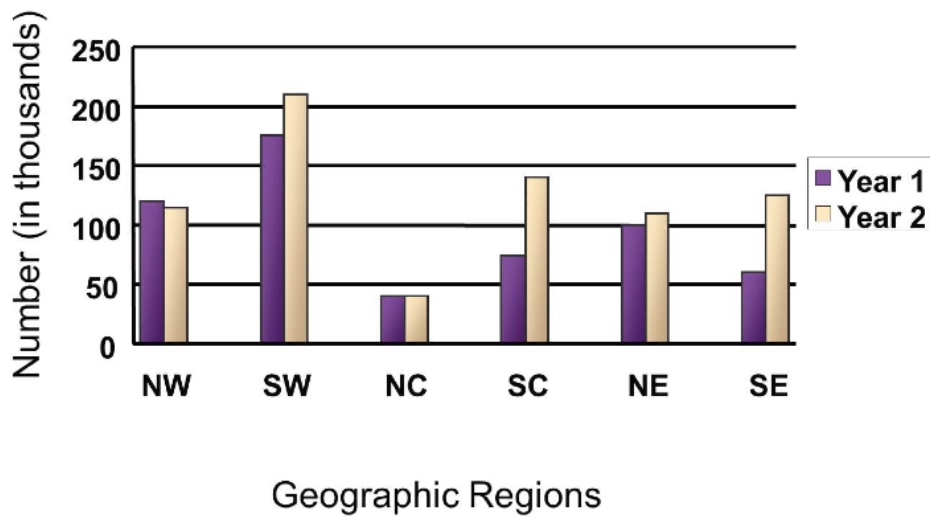
What are Graphs and Charts?

Graphs and charts are pictorial representations of quantitative data. They can summarize large amounts of information in a small area and communicate complex situations concisely and clearly. Each type of graph has its own particular strength.
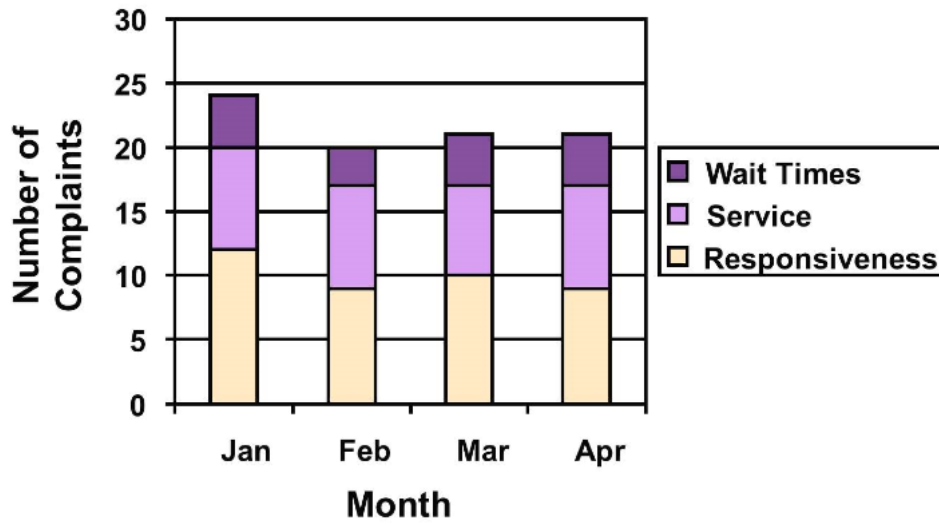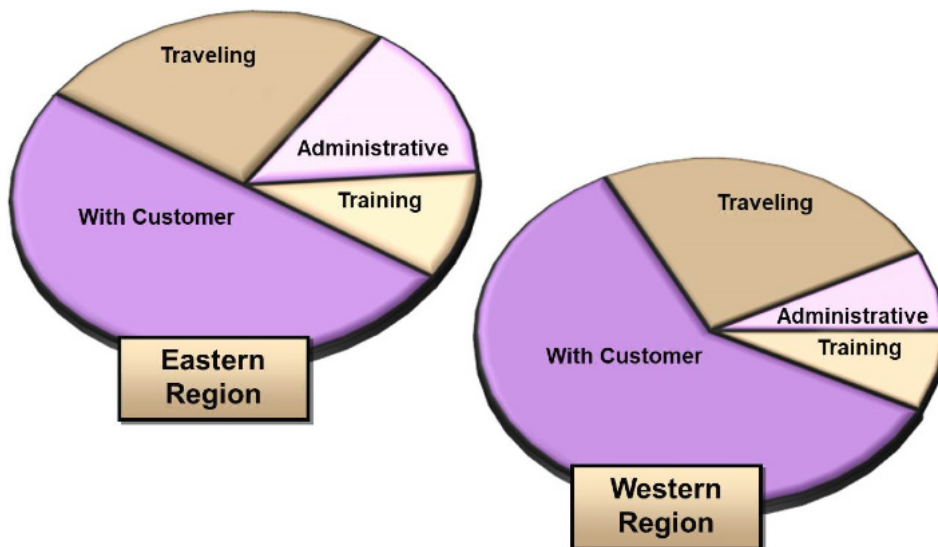
Line Graph

Bar Graph

Notes:

Stacked Bar Graph

Pie Chart

Examples of Graphs and Charts

Healthcare Example (Bar Graph)

Patient Financial Clearance (Baseline Performance)

Cleared: 57% — 2104 Visits
Not Cleared: 43% — 1618 Visits

Period: Sep 15 - Dec 31, 2014
Source: C1200 Financial Clearance Workbook.xlsx, Financial Clearance Data Elements.xlsx
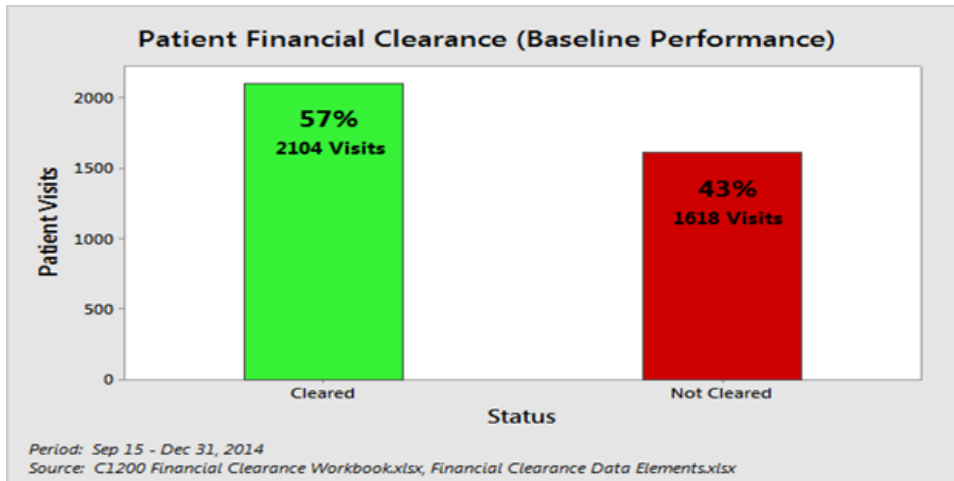
Service Example (Bar Graph)

Contracts Across the Enterprise

(Categories: IT, OPS, HR, Sales/Client Engagement, CLP, Product Management, Business Optimization, FP&L)
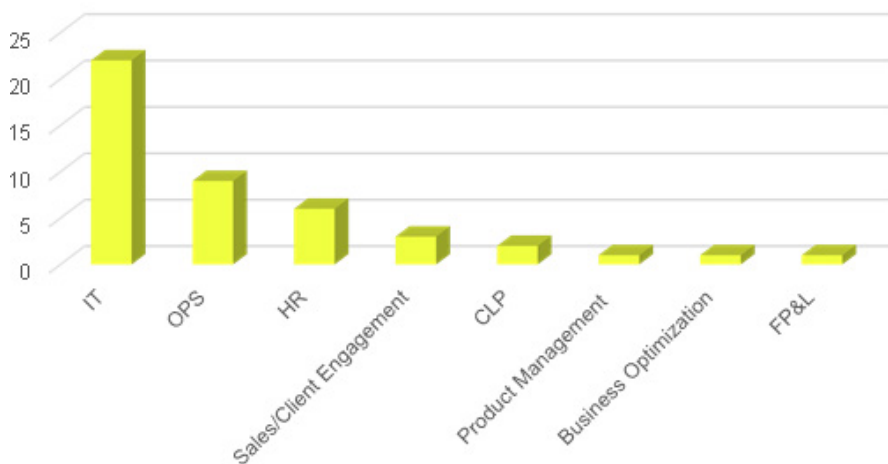
Notes:

Manufacturing Example (Bar Graph)

Top Downgrade Reasons by Specification
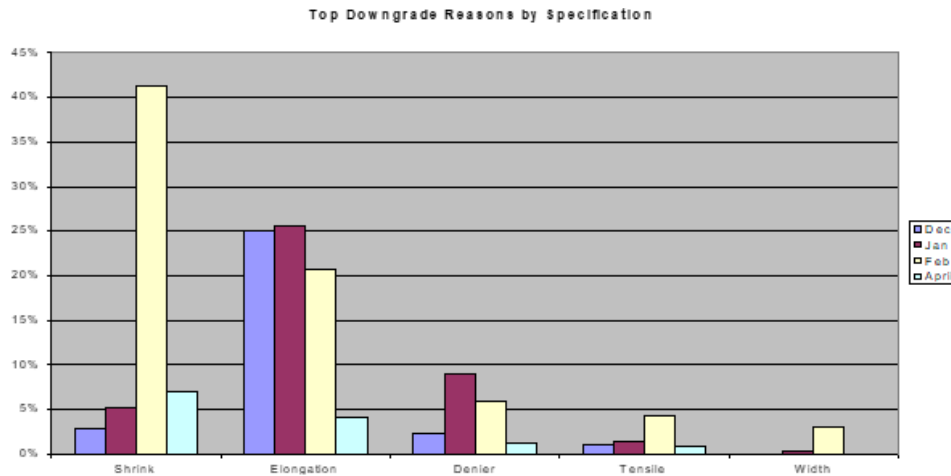
Steps to Construct Graphs and Charts

Line Graph

1. Determine the range of the vertical axis and the size of each increment. Label the vertical axis, including a unit of measure.

2. Determine the range on the horizontal axis and the size of each increment. Label the horizontal axis.

3. Draw axis and, if needed, a grid.

4. Plot each data point.

5. Connect the points with a line.

6. Label and title the graph.

Bar Graph

1. Determine the range of the vertical axis and the size of each increment. Label the vertical axis, including a unit of measure.

2. Choose either a simple, grouped, or stacked bar graph.

3. Determine the number of bars. Draw the horizontal axis. Label the horizontal axis.

4. Determine the order of the bars.

5. Draw the bars.

6. Label and title the graph.

Note: Bar graphs require pairs of variables, but only one needs to be numeric.

Stacked Bar Graph

1. Determine the range of the vertical axis and the size of each increment. Label the vertical axis, including a unit of measure.

2. Choose either a simple, grouped, or stacked bar graph.

3. Determine the number of bars. Draw the horizontal axis. Label the horizontal axis.

4. Determine the order of the bars.

5. Draw the bars.

6. Label and title the graph.

Note: Instead of placing the paired bars next to each other like in a regular bar graph, they are stacked. This is only appropriate when the sum of the dependent variables is meaningful.

Pie Chart

1. Determine the percentage for each category.

2. Convert the percentage values into degrees of angle by taking the calculated percentage of 360 degrees.

3. Draw a circle with a compass, and mark the segments of the pie chart with a protractor.

4. Label the segments, and title the chart.

Note: Pie charts are almost always misleading in some way. In the above example, the two regions likely differ in total hours per sales rep, yet the "pies" are the same size. It is recommended that you use a bar chart or a Pareto chart.

Analyzing Graphs and Charts

Graphic Integrity

A graph must not lie. It should be constructed so that the viewer is not misled. Rather than relying solely on the graphics, look at the written data to ensure that the true information is conveyed by the graph.

Consistent Scale

Numeric scales must maintain regular intervals. Different graphs that might be compared to each other should all be drawn to the same scale.

Ease of Reading

How well a graph is understood and remembered depends on how easy it is to read. Use labels to improve clarity. Place labels close to the object they identify.

Consistency of Symbols

When two or more graphs are to be compared, it is important to maintain consistency along many dimensions, in order to minimize confusion in interpreting the graphs.

Simplicity

Do not obscure information with unnecessary decoration. Before adding text or decoration to a graph, ask, "What additional value or information am I adding?

When Should Graphs and Charts Be Used?

Line graphs connect points, which represent pairs of numeric data, to show how one variable of the pair is a function of the other. Line graphs are good for showing trends.

Bar graphs also portray the relationship between pairs of variables, but, unlike in the line graph, one of the variables need not be numeric. Bar graphs are particularly useful for showing comparisons among categories.

Pie charts are used to visually display the proportions of the various classes of a phenomenon being studied that make up of the whole. Pie charts are useful principally for showing proportions.

Pitfalls to Avoid

- Your eyes can fool you
- Don't rely on obscure notation
- Don't clutter the graph with decoration
- Don't draw conclusions that the data doesn't justify
- Simple graphs and charts do not show statistical significance

Notes: