376 paired comparison

rounds of voting, each time considering just one criterion. This is not recommended. If criteria are important, numerous, or not simple, choose a decision-making tool that explicitly evaluates and weights criteria. See decision matrix, prioritization matrix, effective–achievable matrix, or criteria filtering.

- The number of comparisons increases rapidly with the number of options. Six options require 15 comparisons; nine options require 36. Reduce the list first!
- Numerical prioritization is done silently and individually, so it is useful when group members want to reflect upon their choices or if some members tend to pressure others vocally.

**Pareto chart**

Also called: Pareto diagram, Pareto analysis
Variations: weighted Pareto chart, comparative Pareto charts

**Description**

A Pareto chart is a bar graph. The length of the bars represent frequency or cost (money or time), and they are arranged in order from longest on the left to shortest on the right. Therefore, the chart visually shows which situations are more significant.

**When to Use**

- When analyzing data about the frequency of problems or causes in a process, and . . .
- When there are many problems or causes and you want to focus on the most significant, or . . .
- When analyzing broad causes to their specific components, or . . .
- When communicating with others about your data

**Procedure**

1. Decide what categories you will use to group items.
2. Decide what measurement is appropriate. Common measurements are frequency, quantity, cost, or time.

3. Decide what period of time the chart will include.

4. Collect the data, recording the category each time. Or assemble data that already exists.

5. Subtotal the measurements for each category.

6. Determine the appropriate scale for the measurements you have collected. The maximum value will be the largest subtotal from step 5. If you will do optional steps 8 and 9, the maximum value will be the sum of all subtotals from step 5. Mark the scale on the left side of the chart.

7. Construct and label bars for each category. Place the tallest at far left, then the next tallest, and so on. If there are many categories with small measurements, they can be grouped as “other.”

Steps 8 and 9 are optional but are useful for analysis and communication.

8. Calculate the percentage for each category: the subtotal for that category divided by the total for all categories. Draw a right vertical axis and label it with percentages. Be sure the two scales match. For example, the left measurement that corresponds to one-half should be exactly opposite 50 percent on the right scale.

9. Calculate and draw cumulative sums: Add the subtotals for the first and second categories, and place a dot above the second bar indicating that sum. To that sum add the subtotal for the third category, and place a dot above the third bar for that new sum. Continue the process for all the bars. Connect the dots, starting at the top of the first bar. The last dot should reach 100 percent on the right scale.

Example

Figures 5.133 and 5.134 are nested Pareto charts. Figure 5.133 shows how many customer complaints were received in each of five categories. Figure 5.134 takes the largest category, “documents,” from Figure 5.133, breaks it down into six categories of document-related complaints, and shows cumulative values.

If all complaints cause equal distress to the customer, working on eliminating document-related complaints would have the most impact, and of those, working on quality certificates should be most fruitful.

Also see the Medrad story on page 56 for an example of Pareto analysis used to identify an improvement project.
Figure 5.133 Pareto chart example.

Figure 5.134 Pareto chart with cumulative line.