

# Introduction

The PARETO procedure creates Pareto charts, which display the relative frequency of quality-related problems in a process or operation. The frequencies are represented by bars that are ordered in decreasing magnitude. Thus, a Pareto chart can be used to decide which subset of problems should be solved first or which problem areas deserve the most attention.

Pareto charts provide a tool for visualizing the Pareto principle,\* which states that a small subset of problems tend to occur much more frequently than the remaining problems. In Japanese industry, the Pareto chart is one of the “seven basic QC tools” heavily used by workers and engineers. Ishikawa (1976) discusses how to construct and interpret a Pareto diagram. Examples of Pareto diagrams are also given by Kume (1985) and Wadsworth and others (1986).

You can use the PARETO procedure to

- construct Pareto charts from unsorted raw data (for instance, a set of quality problems that have not been classified into categories) or from a set of distinct categories and corresponding frequencies
- construct Pareto charts based on the percentage of occurrence of each problem, the frequency (number of occurrences), or a weighted frequency (such as frequency weighted by the cost of each problem)
- add a curve indicating the cumulative percentage across categories
- construct side-by-side Pareto charts or stacked Pareto charts
- construct *comparative Pareto charts* that enable you to compare the Pareto frequencies across levels of one or two classification variables. For example, you can compare the frequencies of problems encountered with three different machines for five consecutive days.
- highlight the “vital few” and the “useful many”† categories by using different colors for bars corresponding to the  $n$  most frequently occurring categories or the  $m$  least frequently occurring categories.
- create charts with bars oriented vertically or horizontally
- highlight special categories by using different colors for specific bars

\*Both the chart and the principle are named after Vilfredo Pareto (1848-1923), an Italian economist and sociologist. His first work, *Cours d'Économie Politique* (1895-1897), applied what is now termed the *Pareto distribution* to the study of income size.

†Juran originally referred to these categories as the “trivial many”; however, because all problems merit attention, the term “useful many” is preferable. Refer to Burr (1990).

## Part 7. The CAPABILITY Procedure

- create charts using either a high-resolution graphics device or a line printer
- annotate charts created on graphics devices
- inset summary statistics in charts created on graphics devices
- save charts created on graphics devices in a graphics catalog for subsequent replay
- display sample sizes on Pareto charts
- display frequencies above the bars
- define characters used for features on plots produced on line printers
- save information associated with the categories (such as the frequencies) in an output data set
- restrict the number of categories displayed to the  $n$  most frequently occurring categories

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