EXPANDING YOUR HORIZONS WORKSHOP

Quality Tools for Problem Solving

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Objectives

- Understand how **affinity diagrams** can be used to organize the results from brainstorming
- Use **checksheets** to tally results from a survey that you administer to the other participants
- Create **Pareto Charts** to determine which problems or root causes are the most significant
- Learn a little more about the interdisciplinary profession of quality and process improvement and the Young Quality Professionals (YQP) group within the American Society for Quality (ASQ)!

Background

In this workshop, you will generate an affinity diagram, a checksheet, and a Pareto Chart with your group. Then, you will examine the Pareto Chart to identify the *most significant reasons or causes* underlying a problem that you're interested in exploring.

An **affinity diagram** is a quality tool to help you *organize ideas while brainstorming* the potential causes for a problem, or potential complaints for a situation. It's very easy to create affinity diagrams using post-it notes! In many offices, yellow post-it notes are used for the *ideas that are generated*, and a different color (blue, green or pink) is used to describe the themes.

From http://baran-systems.com/Products/Affinity%20Diagram%20for%20Excel/index_concept.htm

A **Checksheet** is used to tally responses from surveys or from observing defects or problems. A checksheet is also called a tally sheet – or, if you really want to get fancy, a "defect concentration diagram". For example, you could use checksheets to find out the most common words that are misspelled, or the most common errors in a group of students' English papers, or the most common defects you observe in a giant bag of M&Ms:

Type of Error/Reason	Tally	Total Count
Chipped M&M	⊞⊞ ⊞⊞ |	11
Cracked M&M	⊞⊞ |	6
No Letter on M&M	⊞⊞ |||	8
Multiple Defects	|||	3
	Total Number of Defects:	28

A **Pareto Chart** is a sorted bar chart that displays the *frequency (*or *count*) of occurrences that fall in different categories, from greatest frequency on the left to least frequency on the right, with an overlaid line chart that plots the *cumulative percentage* of occurrences. The vertical axis on the left of the chart shows *frequency (*or *count*), and the vertical axis on the right of the chart shows the *cumulative percentage*. A Pareto Chart is typically used to visualize:

- Primary types or sources of defects
- Most frequent reasons for customer complaints
- Amount of some variable (e.g. money, energy usage, time) that can be attributed to or classified according to a certain category

The Pareto Chart is used to separate the "vital few" from the "trivial many" using the Pareto principle, also called the 80/20 Rule, which asserts that approximately 80% of effects come from 20% of causes for many systems. Pareto analysis can thus be used to find, for example, the most critical types or sources of defects, the most common complaints that customers have, or the most essential categories within which to focus problem-solving efforts.

There is an example of a Pareto Chart on the next page.
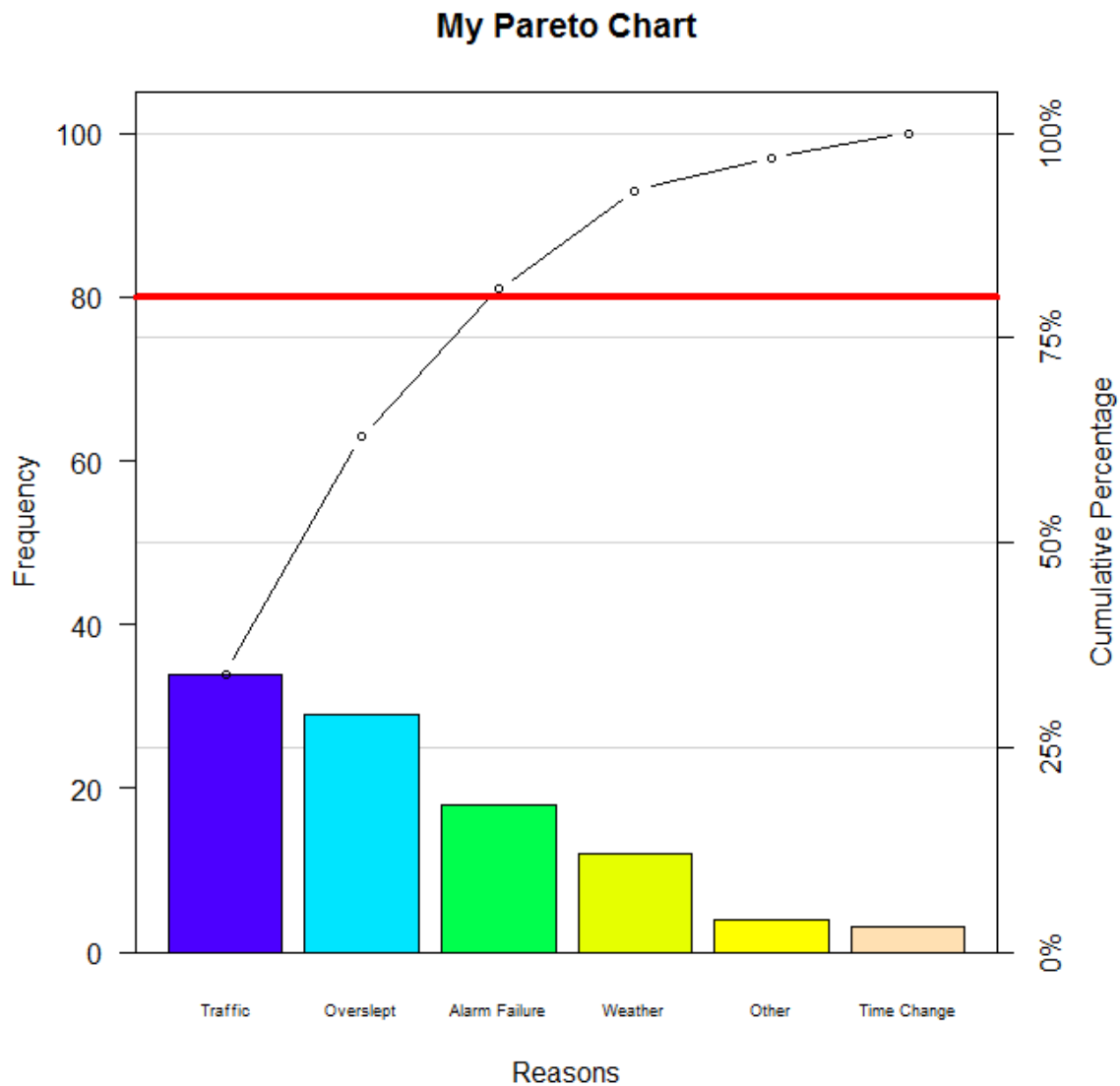
My Pareto Chart

A Pareto Chart showing the most significant reasons why people were late for work, based on a survey sent to 50 people asking them to choose the top 2 reasons why *they* were usually late for work.

Here's how you use the Pareto Chart to figure out which causes or reasons are the MOST SIGNIFICANT:

1. Draw a horizontal line that represents 80% of the cumulative percentage.

2. See where that horizontal line intersects (crosses) the line that arches up and to the right.

3. From the point where these two lines intersect, draw a NEW line straight down towards the word "Reasons".

4. All of the bars on the bar chart to the LEFT of that line are the VITAL FEW – the causes or reasons that should be worked on FIRST.

Preparation with the Affinity Diagram and Checksheet

1. Determine the **PROBLEM** you want to explore. This could be something that represents a *challenge* in your life, or something you have *complaints* about. We will be attempting to uncover the *reasons or root causes* for each one of the challenges or complaints. Here are some ideas, or you can come up with your own. (All groups need to work on a different topic, so the following sample topics are *first come first serve!*)

    a. It's so hard to wake up on time for school in the morning. Why? Which reasons for this are the most significant?
    b. Parents are really irritating. There are so many things they could do to make our lives less stressful. What are the most significant things our parents could change to improve our lives?
    c. Teachers are really irritating. There are so many things they could do to improve what they do in the classroom that would help us learn better, or have a better experience at school. Which ones are the most significant?
    d. As girls in junior high and high school, we have lots of important issues on our minds. Which ones are the most significant?
    e. As girls in junior high and high school, it can sometimes be difficult to find friends or get along with friends. What are the most significant challenges to forming and maintaining friendships?

2. Use **BRAINSTORMING** to generate as many different potential REASONS or CAUSES for the problem that you want to solve. Write each idea on a YELLOW POST-IT NOTE – as many ideas as you can come up with!!

3. Sort your potential reasons or causes into **THEMES**. Your goal is to come up with SIX themes – you'll survey the other attendees to determine which of the themes are the most significant! When your post-its are organized as an affinity diagram, then you are ready to move on to the next step.

4. Post your **SURVEY QUESTION** for everyone in the room to contribute their opinions: "Which 2 of the following 6 choices do you think best represent the REASONS for this problem?"

Analyzing Your Data with the Pareto Chart

1. Put your results in order of **MOST FREQUENTLY MENTIONED** cause or reason and enter them on the "Your Pareto Chart" sheet. Copy over the total counts and percentages, then calculate the CUMULATIVE PERCENTAGES.

2. Draw a **HORIZONTAL LINE** on the Pareto Chart to indicate your GRAND TOTAL of survey responses. Make a tick mark on the axis on the right side to indicate 100%. Now split that into two equal portions and mark 50%. Then split each of those sections equally and label 25% and 75%.

3. Use your data to draw your **BAR CHART** with ONE BAR FOR EACH REASON. The height of the bar should indicate the number of people who chose that item as a reason when they took the survey.

4. Now plot your **CUMULATIVE PERCENTAGES** and connect them with a smooth line.

5. Draw a dotted horizontal line at 80%, and see where it intersects the CUMULATIVE PERCENTAGES line. From that point of intersection, drop a line straight down towards the "Reasons" axis. All of the bars to the LEFT of that vertical line are the **"VITAL FEW"** – the reasons that you should prioritize, and focus on when you start aiming to make improvements or resolve complaints.