Unit 2:
L-3
Statistical Quality Control

Learning Objectives

A **control chart** is a graphical tool for monitoring the activity of an ongoing process. Control charts are sometimes referred to as **Shewhart control charts,** because Walter A. Shewhart first proposed their general theory. The values of the quality characteristic are plotted along the vertical axis, and the horizontal axis represents the samples, or subgroups (in order of time), from which the quality characteristic is found.

Quality Tools

- Any type of device or too that is used to support the quality of all product. It can take the shape of a chart, technique or strategy that can used to ensure quality is maintained during production techniques.

Seven basic quality tool in software development:

- Check list
- Pareto diagram
- Histogram
- Run chart
- Scatter diagram
- Control chat
- Cause and effect diagram

What is histogram?

- Graphical representation of the frequency distribution of data in bar from is called histogram.

- Summarizes data from a process that has been collected over a period of time.

- Histogram provides the easiest way to evaluate the distribution of data.

When are Histogram Used ?

- Summarize large data set graphically.

- Compare measurement to specification.

- Communicate information to the team.

- Assist in decision making.

What are the parts of a histogram?

- Title: The title briefly describe the information that is contained in the histogram.

- Horizontal or X Axis: The horizontal or X-Axis show you the scale value into which the measurement fit. These measurement are generally grouped into intervals to help you summarize large data set.

- Bars: The bars have two important characteristics height and width. The height represent the numbers of times value with an interval occurred. The width represent the length of the interval covered by the bar. It is same for all bars.

- Vertical or Y-Axis: The vertical or Y-Axis is the scale that show you the number of times the value with in an interval occurred.

Constructing a Histogram

- Step1: Count number of data point
- Step2: summarize on tally sheet
- Step3: compute the range
- Step4: Determine number of intervals
- Step5: compute interval width
- Step6: Determine interval starting point
- step7: count number of point in each interval
- Step8: Plot the data
- Step9: Add file

Here we have take employee name and employee working in hours in a week to draw the histogram

Employee Name	Working hour
EMP1	40
EMP2	35
Emp3	45
Emp4	42
Emp5	26
Emp6	36
Emp7	48
Emp8	32
Emp9	52

HISTOGRAM of total working hours in a week (in hrs.)
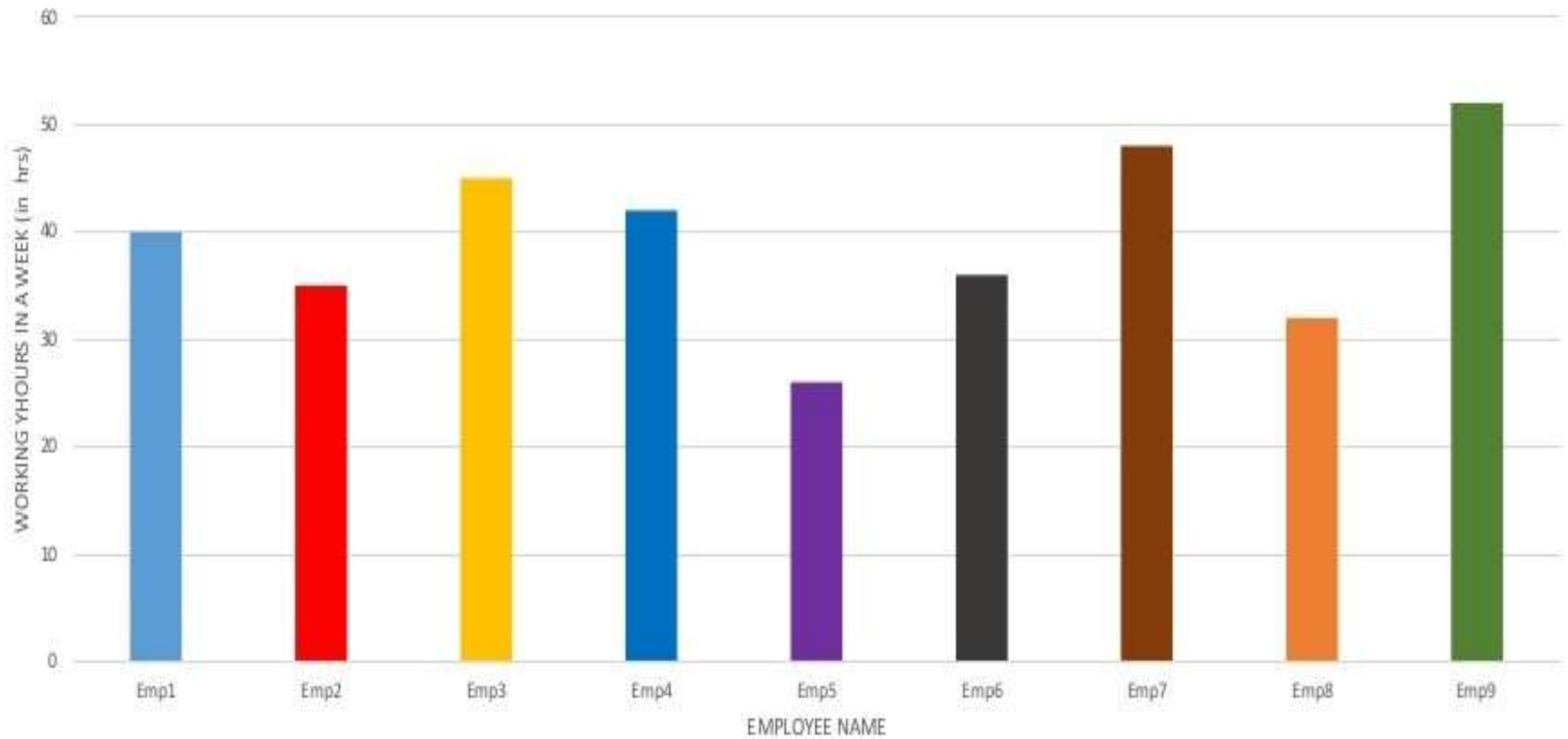
Advantage of Histogram

- Display large amount of data that are difficult to interpret in a tabular form.

- Show the relative frequency of occurrence of the various data values.

- Reveal the variation centering and distribution shape of the data.

- Very useful when calculating capability of a process.

- Helps predict future performance of process.

Disadvantage

- Use only with continuous data.

- More difficult to compare two data set.

- Cannot read exact values because data is grouped into categories.

Summary:

This lecture has introduced the basic concepts of control charts for statistical process control. The benefits that can be derived from using control charts have been discussed. This lecture covers the statistical background for the use of control charts, the selection of the control limits, and the manner in which inferences can be drawn from the charts. The two types of errors that can be encountered in making inferences from control charts are discussed.

References:

- Fundamentals of Quality Control and Improvement: Amitava Mitra
- Montgomery, D. C. (2004). *Introduction to Statistical Quality Control.* 5th ed. Hoboken, NJ:
- ASQ(1993). ANSI/ISO/ASQ. *Statistics—Vocabulary and Symbols-Statistical Quality Control,*A3534-2. Milwaukee, Wi: American Society for Quality.
- Wadsworth, H. M., K. S., Stephens, and A. B. Godfrey, (2001). *Modern Methods for Quality Control and Improvement,* 2nd ed. New York: Wiley.