# Unit 2:
# L-4
# 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.

# INTRODUCTION:-

- If a product satisfy our day to day need we say that the product is of good quality  otherwise is of  bad quality.

- In the market competition the main objective of the producer is to achieve quality assurance in manufacturing.

- The technique of controlling product quality using statistical tool is called **Statistical Quality Control**.

# QUALITY:-

- The following aspects have to be incorporated in the definition of quality:

- conforming to specifications,

- fitness for use,

- customer satisfaction,

- delighting the customer, and

- enchanting the customers.

Having explained the concept of quality in industry, and defined it we now describe various dimensions of quality.

## Dimension of quality:-

1. PERFORMANCE :- primary operating characteristic of a product. A product is judged based on its performance.

2. FEATURES :- additional characteristic along with performance.  For example- Bluetooth in mobile.

3. RELIABILITY:- refers to the probability of a product's failure.

4. <u>DURABILIITY</u>:- refers to the measure of product life or operational life of the product . The life of an electric bulb is an example of durability.

5.  <u>SERVICEABILITY</u>:- consumers are concerned not only about a product break down but also about the time taken before the product is serviced restored.

6.<u>AESTHETIC</u>:- how a product looks, sounds, feels. It is purely subjective.

7. <u>Conformance (Agreement)</u>:- Conformance means meeting specifications.  <u>For example,</u> when we purchase a motorcycle, we check whether the sitting space, weight, size, pick-up, fuel efficiency, etc. conform to thespecifications mentioned by the company.

8. <u>Reputation</u>:- Reputation is related to the past performance of the company.

In order to design and manufacture products of high quality, it is necessary to incorporate all eight dimensions of quality.

# QUALITY CONTROL:-

- Quality control can be defined as: "The process by which we measure the quality characteristics of the product, compare them with the specifications or standard and take suitable actions whenever there is a difference between actual quality and the specifications or standard".

- Now-a-days, quality is controlled by using statistical tools. This technique is known as **Statistical Quality Control(SQC)**.

# STATISTICAL QUALITY CONTROL (SQC):-

- Statistical quality control is defined as the technique of applying statistical methods based on the theory of probability and sampling to establish quality standard and to maintain it in the most economical manner.

# ELEMENTS OF QUALITY CONTROL:-

1. <u>Sample Inspection</u>:- in this some items or units are randomly  selected from the process and then inspected.

2. <u>Use of statistical method</u>:- commonly used statistical tools are random sampling, mean,range, standard deviation,y, binomial distribution, Poisson distribution, normal distribution, etc., are used in SQC.

3. Fundamental Objective:- The fundamental objective of SQC is to decide whether the unit produced is according to its specifications or not.

4. Decision Making:-  to the quality of the product or the

process of manufacturing/producing goods is under control or not.

# TECHNIQUES OF STATISTICAL QUALITY CONTROL
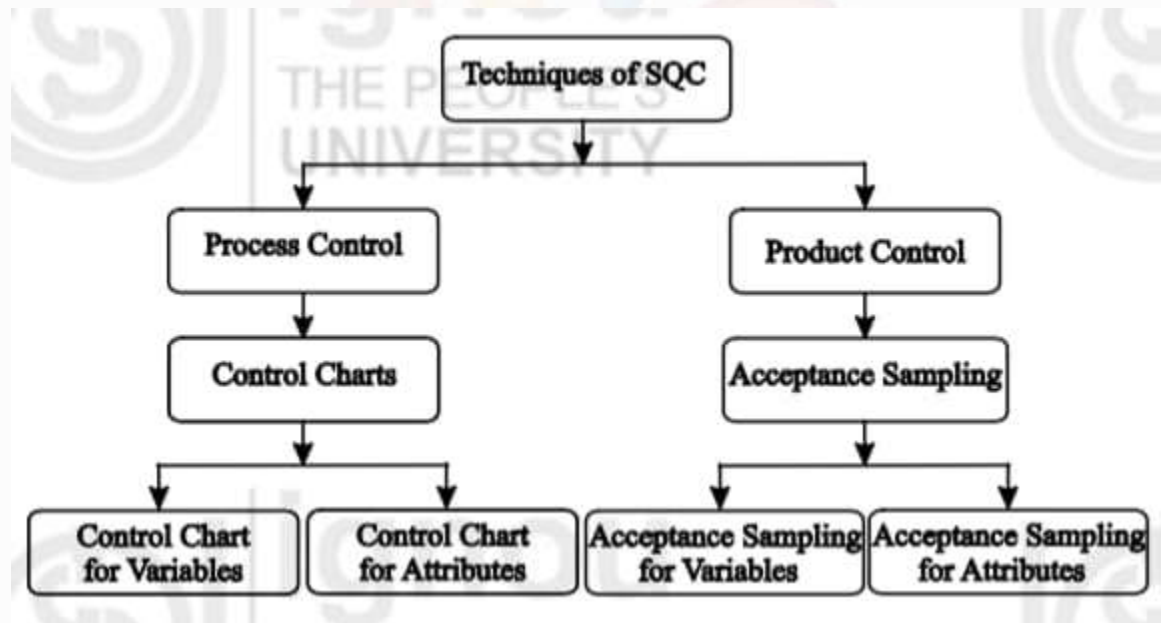
## ADVANTAGES OF SQC:-

1.  Ease of Application

2. Reduction in Costs

3. Greater Efficiency

4. Early Detection of Faulty Units

5. Helpful in Specification

6. Determination of the Effect of Change in the Process

7. Equilibrium in Consumer's and Producer's Risk

## LIMITATIONS OF SQC:-

- When a sample of the items drawn from the lot is not a true representative of the entire lot, does not have the same characteristics as the lot from which it is drawn. Then a good lot may be rejected and a bad one may be accepted. This is the main limitation of SQC.

- SQC applied on a production process provides only the information that the process is under control or out-of-control. It cannot take any action for improvement.

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.