QUALITY CONTROL-UNIT 4

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QUALITY CONTROL

- Quality control consists of two words –'quality' and 'control'.
- Quality is defined as fitness for purpose and control is referred to as the comparison of actual results with the predetermined standards and specifications.
- The quality control may defined as an industrial management techniques or group of techniques by means of which products of uniform acceptable quality are manufactured.
- According to J.A.Shobin quality control means the recognition and removal of identifiable causes of defects and variations from the pre –set standards.

OBJECTIVES OF QUALITY CONTROL

1. To assess the quality of raw materials, semi-finished goods and finished goods at various stages of the production process.
2. To see whether the product confirms to the predetermined standards and specifications or not.
3. In case the product does not satisfy the standards then , to suggest necessary remedial steps.
4. To develop quality consciousness in various sections of manufacturing unit.
5. To reduce the wastage of raw materials, men and machine during the process of production.

PROCESS CONTROL

- The process control helps in building the revised quality into the finished product and prevents production of sub standards product.
- The process control techniques are engaged in evaluation of processes standards in terms of scarp, rework, dimensions, rejection, etc.
- The process control consists of all the procedures employed to evaluate , maintain and improve quality standard at different stages of manufacture.

STATISTICAL QUALITY CONTROL

- It is a scientific technique of controlling quality of statistical methods.
- According to Alfred - SQC is defined as the technique of applying statistical methods based upon the mathematical theory of probability to quality control problems with the purpose of establishing quality standards and maintaining adherence to those standards in most economical manner.

ADVANTAGES OF SQC

1 It gives an early signals of defects.

2 It provides a means of detecting errors at inception.

3 It helps to maintain customer relations by ensuring very high quality .

4 The network and scrap are reduced.

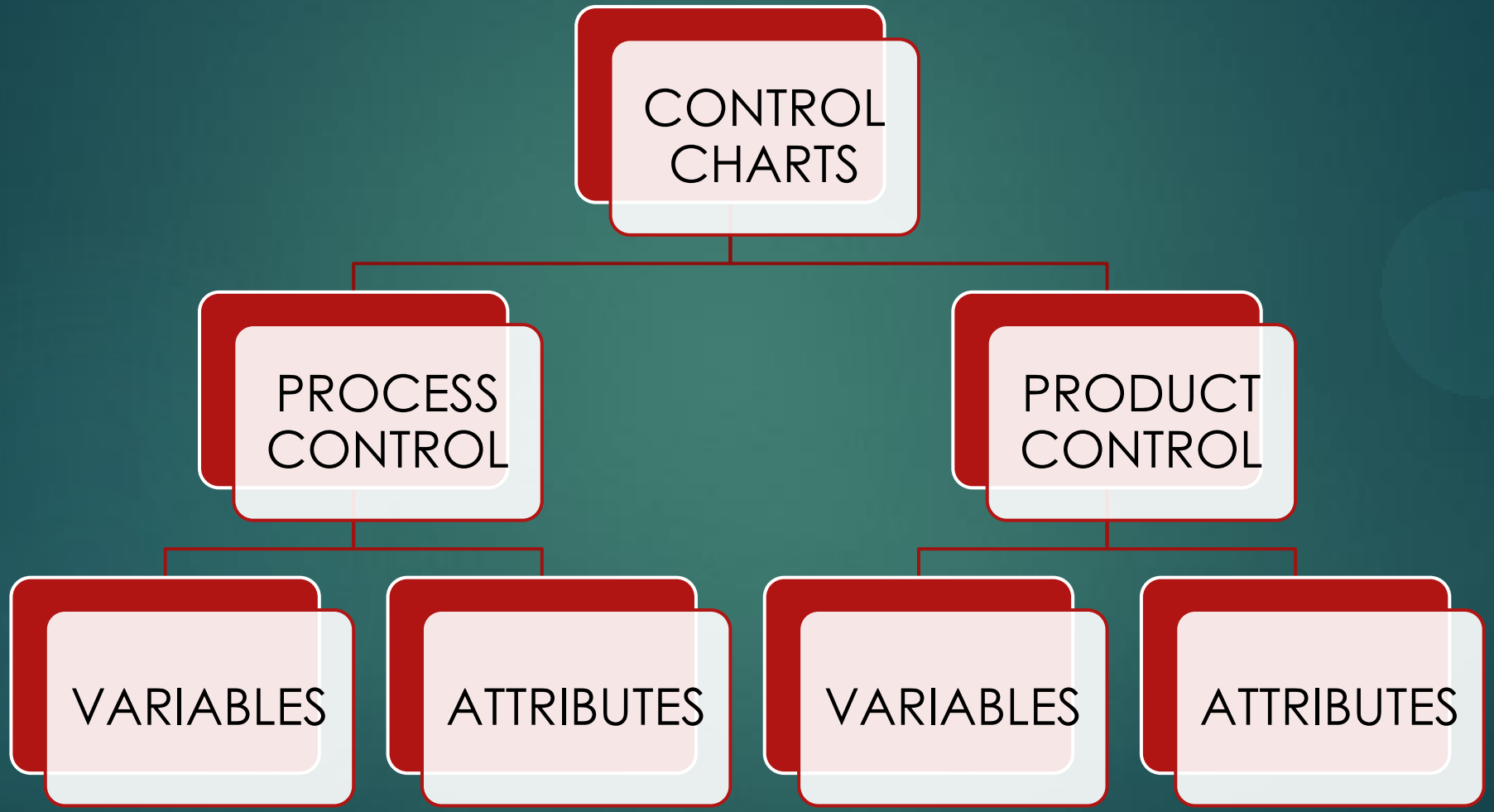
CONTROL CHARTS

- A control chart is a graphical presentation of the collected information. The information pertains to the measured or otherwise judged quality characteristics of the items or the samples .Therefore a control chart is a diagnostic technique.

PURPOSE AND ADVANTAGES OF CONTROL CHART

1. A control chart indicates whether the process is in control or out of control.
2. It detects variations taking place in the process.
3. It ensures about the product quality level.

TYPES OF CONTROL CHARTS



CONTROL CHART FOR ATTRIBUTES

- CONTROL CHART OF FRACTION(P CHART) – This chart is used to control the general quality of the component parts.

p Chart

$$UCL = \bar{p} + 3\sqrt{\left(\frac{\bar{p}(1-\bar{p})}{n_i}\right)}$$

$$CL = \bar{p} = \sum p_i \Big/ \sum n_i$$

$$LCL = \bar{p} - 3\sqrt{\left(\frac{\bar{p}(1-\bar{p})}{n_i}\right)}$$

p_i = number of nonconforming items
n_i = sample size

CONTROL CHART OF DEFECTIVE ITEMS

Reliability Engineering Services
HALT & Classical Techniques
"Reliability Integration"

OPS A LA CARTE

NP Chart Formulas

$$UCL_{np} = \overline{np} + 3.\sqrt{\overline{np}\left(1 - \overline{p}\right)}$$

$$LCL_{np} = \overline{np} - 3.\sqrt{\overline{np}\left(1 - \overline{p}\right)}$$

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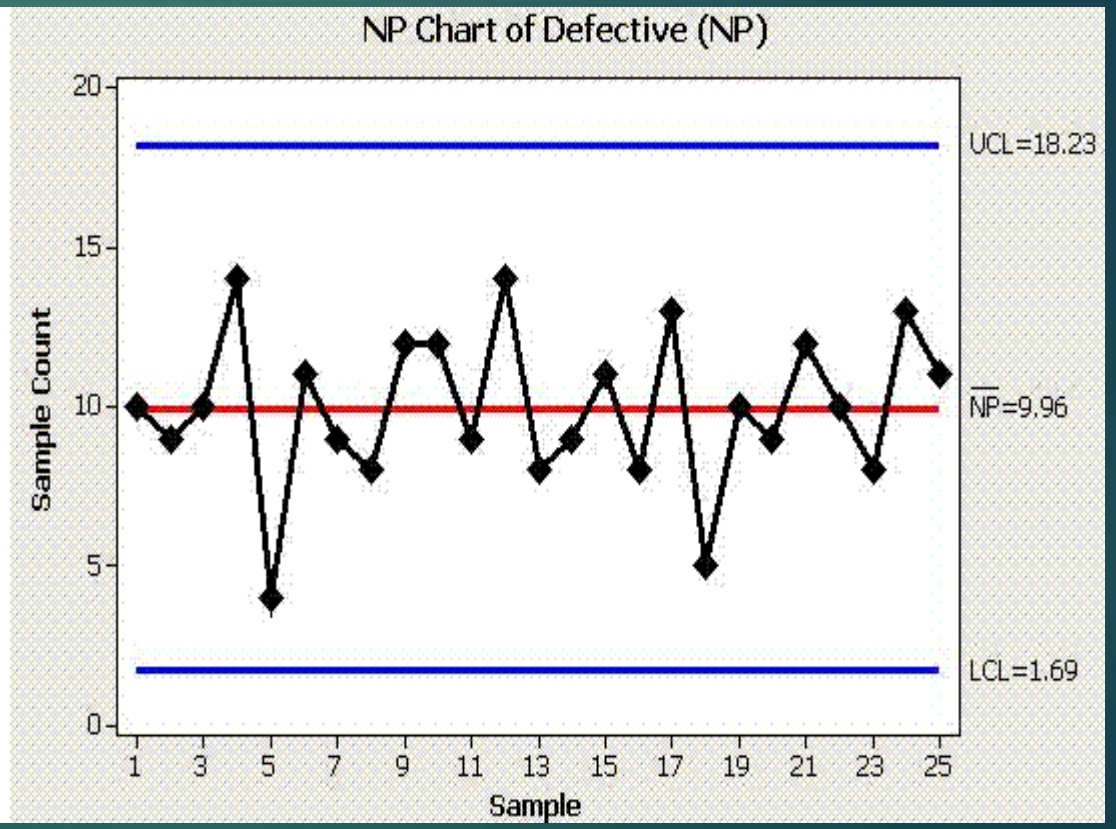


SINGLE SAMPLING PLAN

- In single sampling plan a lot is accepted or rejected on the basis of single sample drawn from the lot.
- METHOD:- Following steps are used:-

1.A single sample of size n is selected from the lot.The sample size may either be calculated with the formula square root of(2N) or found from the table.

2.The sample is inspected and the defected components from the lot are selected and taken out.

3.If the no. of defective pieces exceeds the acceptance no. C,then the lot is rejected.

4.If the lot is rejected then each and every piece of the lot is inspected.The defective parts are replaced.

- If x<=C →accepted
- If x>=R →rejected
- If C<x<r→ take the next sample

DOUBLE SAMPLING PLAN

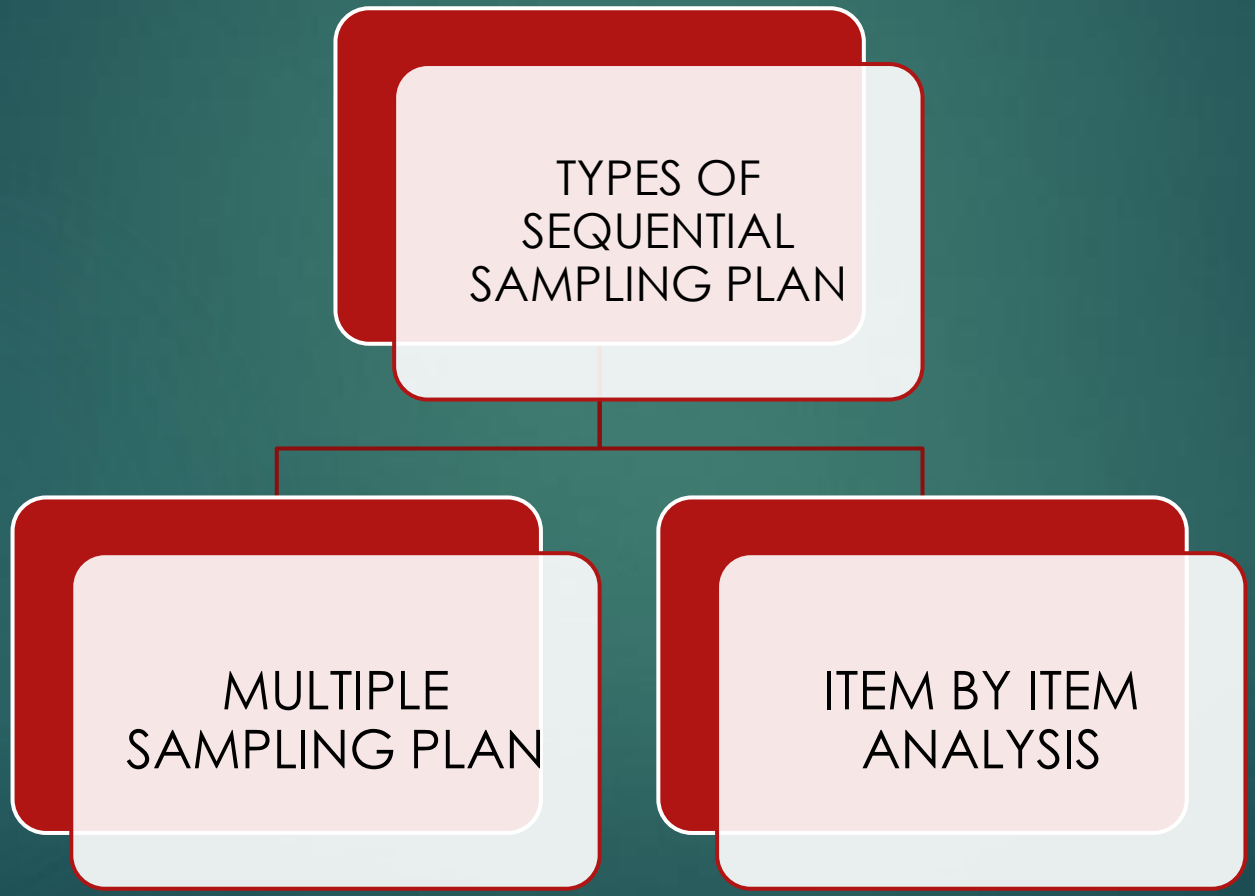
- DOUBLE SAMPLING PLAN PROCEDURES
- Given that C1 and C2 as acceptance no. and C2>C1.
- PROCEDURES :

1.Inspect a sample for size n1 and count defective parts K1.

2.We have the following three possibilities:

- → K1<=C1 (Result : accept the lot)
- → K1 > C2 (Result : reject the lot)
- → C1<K1<=C2 (no decision)

SEQUENTIAL SAMPLING PLAN



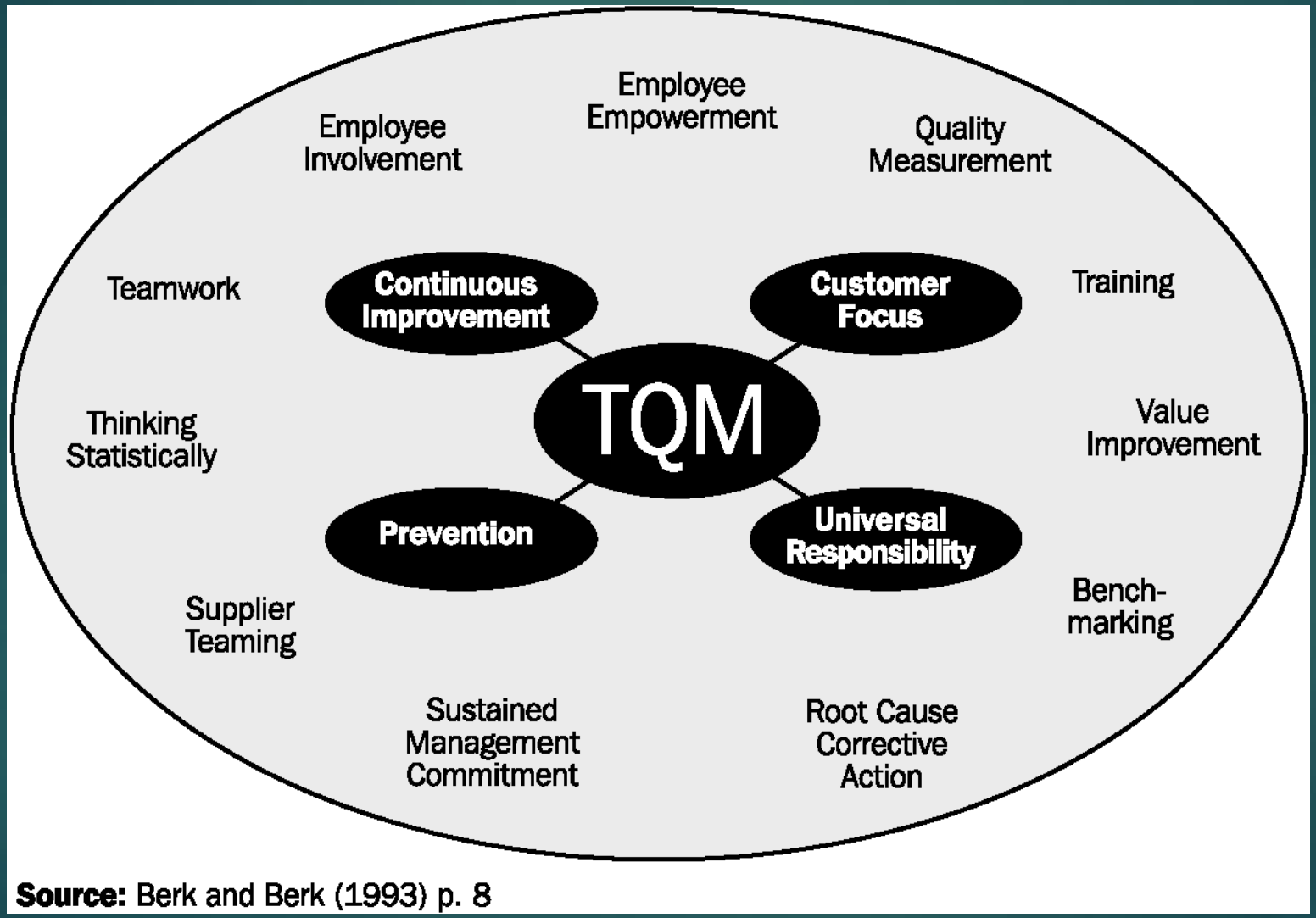
- Multiple sampling plan:- It accepts or rejects alot upon the results obtained from several samples .
- Item by item analysis:- It is a plan in which size is increased by one piece at a time till the sample becomes large enough and contain a large number of defective pieces to decide whether a lot should be accepted or rejected, this plan is easy to design but more expensive because more steps are needed to take the decision.

TOTAL QUALITY MANAGEMENT

- The word "TOTAL QUALITY MANAGEMENT" comprises of 3 words :
- 1. TOTAL → made up of the whole
- 2. QUALITY → degree of excellence that a product provides
- 3. MANAGEMENT → art or manner of handling ,controlling , directing etc.

- Hence , TQM is an effective system for integrating the quality maintenance, quality development and quality improvement efforts of different functions of business to enable production and services at most economical levels to meet customers satisfaction.

ELEMENTS IN TQM



Source: Berk and Berk (1993) p. 8

PILLARS OF TQM