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Contemporary Quality Management Approach

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Contemporary Quality Management Approach

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I. Introduction

In popular use of quality gurus and experts in the field, the word Quality is meeting customer requirements. However, this is too imprecise and limited idea of quality to be of any use. Quality is based upon supplier actual experience with the product or service, measured against requirements-stated or unstated, conscious or merely sensed, technically operational or entirely subjective in meeting requirements aimed at the needs, requirements and expectations of customer and supplier, present and future.

Quality is production of product or offering service which fulfills an aggregate needs and requirement of customers and suppliers, in all aspects. customers and suppliers quality priorities may be very different. suppliers quality priorities are producing non defectives profitable products which customer can buy satisfactorily and use effectively. Profitability is suppliers need where as customers ability and capability to use products for functions it produced appropriately is suppliers requirement. Because what is seen and added as important by the supplier in exceeding customers need, requirement and expectation may be very different from the priority concerns of the customer.

This article present the general concept of quality and quality management. Core concepts of process control using mathematical techniques to measure, analyze and monitor product quality and maintain processes to fixed targets by monitoring, controlling and managing quality to manufacture a product as designed with in allowable Percentage Defectives is aim of this article.

II. Analysis and Result

Quality control is essential activities and techniques employed at the point of operation or production to achieve and maintain the quality of a product, process, or service. It includes a monitoring activity, but is also concerned with finding and eliminating causes of quality problems so that the requirements are continually met.

Currently, many scholars and quality practitioners and controller are measuring if or weather process is in control for incapable process by measuring distribution of number of observed defectives data. They are measuring and monitoring processes on which control limit of data with sample size n and sample number m directly doubled if number of defectives of data doubled and both processes data are treated as in control as if both processes are producing products with in allowable Percentage Defectives. For instance, figure below shows control chart of sample data of two processes with doubled number of defectives for the same number of sample size (50) and Sample number (10) where both process are in control with doubled control limit value proportional to defectives.

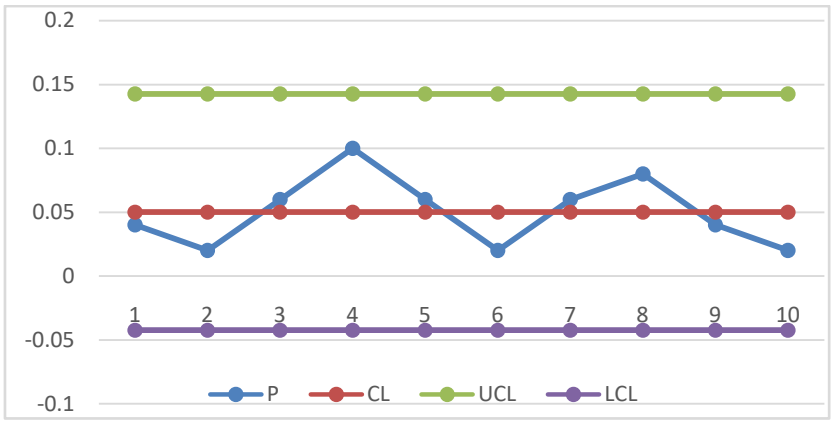

Figure 1: Control chart for number of defectives data I

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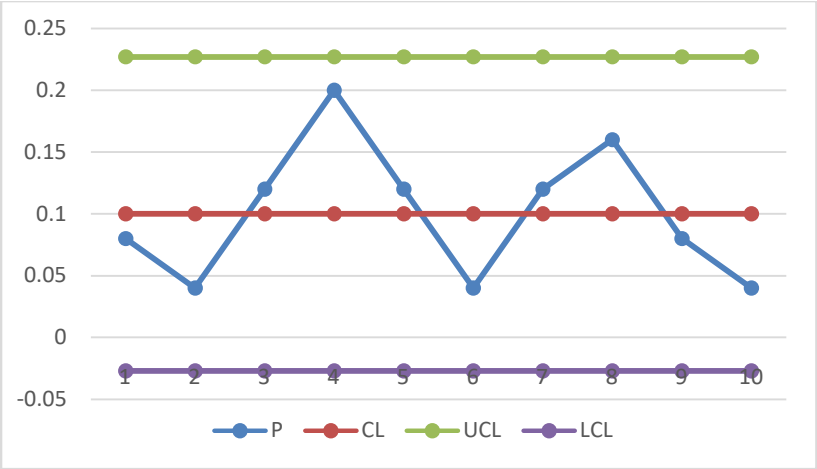

Figure 2: Control chart for number of defectives data II

Note: Percentage Defectives of both processes are 0.05 and 0.1 which doubled as number of defectives double. Since they are monitoring defectives distribution in relation to control limit doubled or tripled as number of defectives doubled or tripled, they forget to compare with allowable defectives that meets permissible Percentage Defectives for sample size n and sample number m of sampling.

Sampling, Sample size and sample numbers, which shall be determine by Costs and time required are two basic for quality monitoring and process control to manage quality of products and services so that we can manage Quality let alone quantity of product is one factor which determine Sample numbers of Rational sub group. Rational sampling group sample size of sampling is basic factor to determine Rational permissible number of defects per sample where as Sample numbers of Rational sub group ascertain number of permissible defects of total sample.

Note: As number of product sampled increase number of defective products in relation to sample size increase. Thus, Sampling with lower number of Sample numbers of Rational sub group should produce lower number of defective products in relation to sample size where as Sampling with higher number of Sample numbers of Rational sub group can have higher number of defective products in relation to sample size. Moreover as quantity of sample size increase number of permissible defective products should decrease logarithmicly. Because variation in production of specified sample is low and expected quality level should be high and number of defective products in relation to sample size must be low to attain and assure quality level we must meet and exceed expectation. Hence process capability is more than one and increase as sample size increase.

There fore

$$D = Log\ n^{Ns}$$

Where

D- number of permissible defectives
Ns- total number of product sampled which is n*m
n- sample size
m - sample numbers

Note: sample size is base where as number of sampled is factor of quality control logarithm function. Mean or control limit of control chart of number of defectives should be number of permissible defectives of sampling.

We can say process is in control if number of defectives of sampling Rational sub group is less than or equal to number of permissible defectives of sampling. Based on mutual understanding tolerance can be added mainly to decade and set upper control limit which shall be based on Proportion of population covered with ɣ% Confidence of sample size n. Process must be in control and produce products at list with three ɣ% Confidence of sample size n from Mean or control limit. Thus upper and lower control limits of number of defectives control chart must be:

$$D \pm 3 * I$$

Where

D is number of permissible defectives
I is number of tolerable defectives with ɣ% Confidence of sample size n

$$UCL = D + 3 * I$$

Thus $$CL = D$$

$$LCL = D - 3 * I$$

Note: ɣ% Confidence of sample size n should be determined based on ratio of sample size to products from which it sampled.

With the help of GGOOCHAA let as see example

Example: table below show number of defectives (d) Samples data of 20 Sample number with 90% Confidence of 200 sample size to monitor process using

number of defectives control chart where Sn is sample numbers and d is number of defectives.

Table 1: Number of defectives data

Sn	d	Sn	d	Sn	d	Sn	d
1	1	6	2	11	2	16	4
2	3	7	1	12	4	17	2
3	4	8	3	13	3	18	1
4	2	9	5	14	1	19	3
5	1	10	3	15	3	20	2

Sample Number = 20
Sample size n=200
Total number of product sampled Ns is:

$$NS = m * n = 4,000$$

Number of permissible defectives D is:

$$D = Log^{4,000} 200 = \underline{1.56541201}$$

Note: with 1.56541201 number of permissible defective expected process capability Cp_E is approximately 1.3 with 0.00782706 percentage of defectives which is more than data process capability Cp_d of 1.2 with 0.0125 percentage of defectives. thus tolerance is required as per agreement and For 90% Confidence of 200 sample size I= 0.981

Thus, Control limits of control chart are:

CL= 1.56541201

UCL= 4.50841201

LCL= -1.37758799

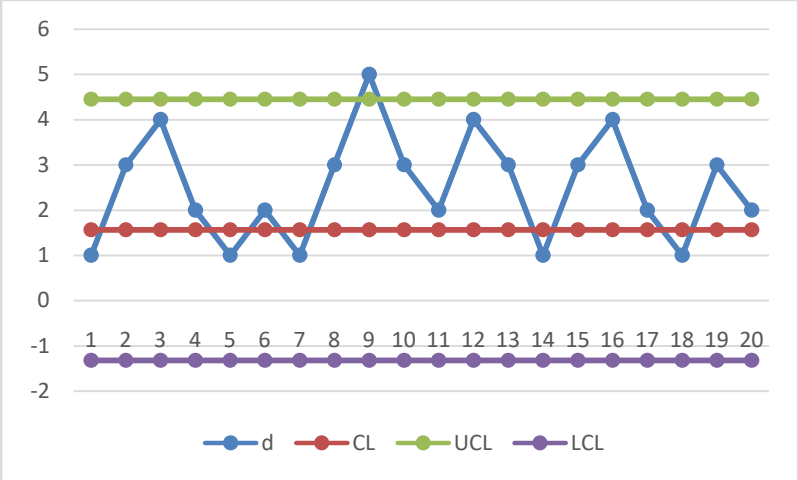

Figure 3: Control chart of number of defectives data and permissiblty

Note: with 90% Confidence of 200 sample size tolerated process capability Cp_t is less than 1.2 with 0.02254206 percentage of defectives which is less than data process capability Cp_d of 1.2 with 0.0125 percentage of defectives. Thus, we can say that the process is capable even though it is out of control with out of control data of number of defectives.

Moreover, with defectives tolerance of 90% Confidence of 200 sample size

1. Five samples of data produce defectives less than number of permissible defective, Hence process at that sample meet customer requirement satisfactorily and the product produced of that sample shall be fully accepted by customers.
2. Hence sample of sample number 9 produce defectives more than number of Tolerable defectives, process is out of control to meet customer tolerable requirement and the product produced of that sample shall be fully rejected by customers.
3. The rest 14 samples produce defectives more than number of permissible defective but less than number of Tolerable defectives, hence process is in control to meet customer tolerable requirement and the product produced of samples shall be tolerated and accepted by customers as per their agreement and level of data process capability Cp_d.

III. Discussion and Conclusion

Quality is based upon supplier actual experience with the product or service, measured against requirements-stated or unstated, conscious or merely sensed, technically operational or entirely subjective in meeting customer requirements aimed at the needs, requirements and expectations of customer and supplier, present and future. Quality management mean improving the quality of everything, i.e. creating a high quality company; high quality man, machine, material, methods and information in satisfying or exceeding customers and suppliers present and future

need, requirement and expectation by operating with in lower Percentage Defectives.

Scholars are saying Percentage Defectives for Different Values of Cp and Cpk for Smaller-the-Better and process with less than one Cp is in capable. Where as currently many scholars and quality practitioners and controller are measuring if or weather process is in control for incapable process with high Percentage Defectives. For instance to say process is capable with at list Cp=1 Percentage Defectives must be less than 0.135. moreover, they are only monitoring process if or weather in control based on observed defectives data rather than permissible number of defectives in relation to sample size n and sample number m. As per their analysis number of defectives control chart measure uniformity of ratio of number of defectives per sample size across sample numbers. Hence for process producing products far from allowable number of defectives having uniformly distributed banch of defectives are treated as in control.

Sampling, Sample size and sample numbers, are two basic for quality monitoring and process control mathematically to manage quality of products and services within tolerable number and/or Percentage Defectives as per customers and suppliers agreement so that they manage and meet Quality by satisfying or exceeding customers and suppliers need, requirement and expectation. Mutual agreement of customers and suppliers on sampling, Sample size and sample numbers, and on γ% Confidence of sample size n determine factors of control chart control limits and hence permitable and Tolerable number of defectives of Rational sampling group quality level so that product can be accepted or rejected and process can be monitored if or weather capable and in control to produce product as designed with in allowable Percentage Defectives.

Acknowledgement

A lot of thanks to GGOOCHAA

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