Title: Improper Application of Statistical Analysis Tools to Quality Improvement Activities

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Abstract:

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Submitted to
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Synopsis:

TQM, Total Quality Management, is implicitly directed at everything related to the business operation; that's what makes it "total." Production people have worked for years under the guidelines of inspection and quality control activities and have well established methods for monitoring and controlling product quality. However, the methods that are used for quality assessment in manufacturing are not directly transferable to the analysis of quality results in administration, support functions or the service sector.

In the manufacturing and production environment, quality control tools have been designed to solve engineering problems. In the service sector, quality is typically applied to smaller population sizes and more human relations type problems.[b,252]

The activity of measuring, and controlling to change an identifiable production output seems tangible; it 's easy to understand and accept. Control of mass production using statistical analysis is reasonable. We are dealing with quantities that suggest the likelihood of a distribution offering some potential for predictability. The manufacturing process is intended to be a repeatable process; in fact, we monitor to assure that it is. Service on the other hand is a product of human performance and subject to the biases and personalities of the performer; a disastrous effect on statistics and the science of sampling. Sense the science of probability is predicated on the capture of randomized data; it

would suggest that human habits might interject inaccuracies into the application of statistical methods that are applied to the analysis of service and support activities.

The purpose of this paper is to investigate the differences and cautions that need to be observed when applying quality analysis and statistical analysis tools to the support sectors of business operations.

Introduction

TQM is predicated on the involvement of the whole organization. The use of quality control techniques have almost a century long history of application in the manufacturing environment. Their application is associated more with production of products than with performance of service. [b, p252]

Production areas are understandably ready to participate in the use of quality measurement tools to verify the effectiveness of changes implemented to support tasks peripheral to the production activity. They too may be lulled into application of their everyday analysis tools on inappropriate data.

In these technical settings, the use of technical problem solving and monitoring is a natural part of the environment. Production is populated with engineers and technicians who are accustom to analytic approaches. Their confidence and comfort in applying these tools to the analysis of support activities is no safer or more valid than the enthusiastic application of the same tools by the inexperienced quality teams that are the business fad for the 90's.

That improvements won't be made on the basis of poorly collected and analyzed data is not certain. "There may well be a wealth of information in a non-probability sample." [Getlow, p569]. Engineering and even life itself, has many successes based solely on imperial data. However, the users of these techniques should have clear understanding of when the data and processes will not yield correct or usable information. Too little caution and guidance has been given empowered masses regarding this.

Analysis

There is a danger in imitating factory quality control practices in the analysis of service operations. In service, the quality must be applied to all of the business components; in manufacturing the quality control processes are focused more on the manufacturing process and their output. [p5]

Control charts have useful applications for indicating when an activity or process needs corrective action...this is the end result objective. Building the path to that end requires careful construction.

The seven tools of quality are the building blocks for achieving quality improvement. Through our ability to measure and control we can ultimately make changes for improvement. The changes are not identified by the control chart; only the need for action is indicated. The next step to improvement is a search for assignable causes.

Failure to recognize independence of the measured units can produce extensive errors in an analysis. A company seeking to analyze its delivery service to customers needs to account for the unit of delivery being the truck not the customers' package. Any given truck can have several customer's shipments. There is a very high risk of sampling identical observations across multiple measurements

Coulson and Cousan [t, 1989] outline a good relationship between the seven tools of quality improvement and the use of statistical methods. They point out that the seven tools serve well for tracking and control; but statistical processes are required for improvements. Their example of the plastics molding industry using material controls and part specification controls to maintain molding quality illustrates failure to include all of the influences. When the process flow chart was constructed in detail and Ishakawa, cause & effect diagrams were applied, it revealed variables that had equal potential to influence output quality. Examinations of variabilities established appropriate areas for action and improvement.

In service activities the use of "judgement sample" will frequently provide more useful data than random sampling. Having an expert choose the settings and situation that captures the average conditions imposed on a characteristic of interest will make the data collect about that characteristic lowest in variability and therefore more useful. {Gitlow, p 557] An example would be the evaluation of a machine under variable operators skills. Random selection of the operators would induce a wider data variation than selection of a group composed of most and least skilled.

A common quality factor for a service activity is "delivery time". This can be significantly influenced by customary business practices such as working hours or holidays and result in significant measurement errors in the statistical process. [z, p5].

Different problem handling techniques that achieve the intended performance objective but reflect the performers personal preference violate a key assumption for statistical control charts. Here the measurement tool assumes a