Title: The Use of Statistical Methods in the Measurement of Customer Satisfaction

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Author(s): D. Millard

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Daryl Millard

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BY

DARYL MILLARD

"The Use of Statistical Methods in the Measurement of Customer Satisfaction"

The purpose of this paper is to discuss the statistical tools used in the measurement of customer satisfaction. However the tools have no meaning unless they are framed within the Total Quality Management (TQM) context. So, it would only seem proper to set the TQM stage.

As we enter the nineties, more and more authors are writing books and articles on total quality topics. What is this thing called TQM anyway? The United States Department of Defense has defined TQM to be "both a philosophy and a set of guiding principles that represent the foundation of a continuously improving organization. TQM is the application of quantitative methods and human resources to improve the material and services supplied to an organization, all the processes within the organization, and the degree which the needs of the customer are met, now and in the future. TQM integrates fundamental management techniques, existing improvement efforts, and technical tools under a disciplined approach focused on continuous improvement." {1,Pg 4}

The statistical tools that have become a fundamental element of TQM philosophies and principles during the 20th century, sprang from the work of Dr. Walter A. Shewhart. While employed by the Bell Laboratories, his efforts to improve quality and reduce variation in product manufacturing lead to his developing

statistical control charts. The ideas and principles are discussed in his book "The Economic Control of Manufactured Product published by Van Nostrand in 1931."[2, Pg.i] During WWII statistical control charts and acceptance sampling plans developed by H.F. Dodge and H.G.Romig became the standard tools of industries supplying products to the military.[3 pg.1] Among the emissaries sent from the United States after WWII to help rebuild the Japanese industrial complex was Dr. W. Edwards Deming and Dr. Joseph M. Juran.

These two men greatly influenced the birth of the Japanese quality movement. It is especially evident when the most coveted quality award in Japan is called the Deming Prize named for Dr. Deming.

While in Japan during the 50's, Dr. Deming lectured to Japan's top business leaders and to the Japanese Union of Scientists and Engineers (JUSE) about statistical quality control. He told them they could become world-class quality leaders if they followed his advice. [4, pg 64]

During the 50's and 60's, American manufactures had a wide open marketplace. While other countries were having to rebuild their factories, the Americans just shifted to consumer goods manufacturing. The market demand was high for consumer goods but the supply was low. As a result, the American manufacturers could sell all that they produced.

Out of the 60's and 70's and into the eighties came the global competition lead by the Japanese. It was the decade of the 1980's when American industry began to focus on quality.

It became a matter of economics. Take Xerox for example, between 1976 and 1982 America's famous copy machine maker watched its market share plunge from 82 percent market share to 41 percent market share. [5, Pg 194]
Xerox found itself in the position of having copiers made by its' Japanese competition Canon selling for less than what it cost Xerox to build comparable models. [6, Pg 188]

Ford Motor Company's losses during the three years beginning in 1980 totalled 3.26 billion dollars. [7, Pg 139]
It was during this time that the American manufacturing companies began to be discover the American quality leaders Deming, Juran, Feigenbaum, and Crosby.

Even though these quality leader's teachings differ to some degree, their influences are embodied in the Department of Defense Definition of TQM or any other commonly accepted definition of TQM.

The elements of this definition that directly apply to this paper are a company's responsibility to assure that the "needs of the customer are met" and that they practice the "application of quantitative methods." [8, Pg 4]

To paraphrase, these elements are Customer Satisfaction and Statistical Methods/Tools.

It is important to understand that from a TQM viewpoint these are two kinds of customers - internal and external. Internal customers are the people within an organization that receive services or products from the other people within the organization. "Each worker therefore is a customer of preceding

workers; and each has customers, the people to whom the worker passes on his or her work" [9, Pg 2-5] External customers are the people or companies outside of the organization that pay for the goods or services produced by the organization.

Why should a company care about customer satisfaction? The succinct answer is that customer satisfaction directly affects a company's profitability. A business that does not satisfy its customers needs and desires won't be in business very long. Studies have shown that it's five times more expensive to acquire a new customer than it is to maintain an existing one. Also, dissatisfied customers tell 8 to 20 people about their unhappiness which satisfied customers only tell 3 to 5 people about their happy experience. [10 Pg. 65]

Why measure customer satisfaction?

Tom Peters, author of the bestseller In Search of Excellence, has said "You are what you eat and what gets measured gets done".

Measurements provide the vehicle for the "application of quantitative methods". The measures allow a business: 1) to know how well the business process is working; 2) know where to make changes to create improvements, if changes are needed; and 3) determine if the changes led to improvements. [11 Pg. 1]

What do companies measure?

Applying total quality principles, a company must produce products and services that "meet the needs of the customer." [12, Pg 4] Thus a company must first determine what their customers requirements and expectations are.

Federal Express, a 1990 Malcolm Baldrige Quality Award (MBNQA) winner has identified what they call service quality indicators (SQI). The 12 SQIs are as follows:

Indicators	Weight
Abandoned Calls	1
Complaints Reopened	5
Damaged Packages	10
International	1
Invoice Adjustments Requested	1
Lost Packages	10
Missed Pick-ups	10
Missing Proofs of Delivery	1
Overgoods (Lost and Found)	5
Right Day Late Deliveries	1
Traces	1
Wrong Day Late Deliveries	5

[13, pg 56]

Reynolds Metals Longview Reduction, , has identified such customer requirements as length, diameter, and weight of the product. Product chemistry, packaging, and stenciling among others for its cast aluminum ingot and billet products. (See Customer Survey Checklist Appendix 1)

Another company might measure "if orders were shipped complete and on time, and delivered within a prescribed time period." Customer complaints might also be measured.[14 Pg. 51]

The statistical tools most commonly used in the measurement of customer satisfaction are:

1) Basic statistics
    a) measure of central tendencies - averages
    b) measures of dispersions - standard deviation
2) Run charts

It is important to remember that there has to be a method or tool to produce customer satisfaction data that the statistical tools can manipulate. [20, Pg 216]

The typical method or tool that most companies are using to generate customer satisfaction data is the customer satisfaction survey. The data obtained from these surveys are then transformed through statistical methods to quantify the level of customer satisfaction.

In the appendices I have included 3 examples of customer surveys that companies typically utilize. Until now, when customer satisfaction was discussed the examples used were for external customers. It is important to remember a TQM organization also should use the statistical tools to assess internal customer satisfaction. Appendix 3 is an employee survey or internal customer and appendix 4 shows that for this survey basic statistics was used to acquire a numerical rating per category.

In the future statistical tools will always be needed quantify data. With respect to customer satisfaction, the trend is to utilize Quality Functional Development (QFD) to design customer satisfaction into the product or service.

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