

## Pros and Cons of Six Sigma: A Library Perspective

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### Abstract

Six-Sigma aims to maximize user/customer satisfaction and minimize defects in products and services being offered by an organization. The present paper is an attempt to critically evaluate the relevance of six sigma statistical thinking with a focus on library and information services. The theoretical framework in attaining the quality services through the methodologies of DMAIC and DMDAV or DFSS of Six-sigma, tools used within Six-Sigma, pros and cons of Six-Sigma for library and information services' management has been discussed at a length. The paper also presents its reservations on the benefits of Six-Sigma for renovating library and information services in the information acquisition, processing, circulation, utilization and user satisfaction.

**Key words:** - Six-sigma, Information services, TQM.

### 1. Introduction

Six-Sigma is a business marketing strategy which aims to maximize the user satisfaction by minimizing the defects. It was developed by Motorola, U.S.A. in 1980's but has its roots in Statistical Process Control (SPC) which first appeared in 1920's.

Six-sigma is a technique which advocates the attainment and improvement of quality of processed output by identifying and removing the root causes of defects and minimizing variability in the manufacturing and business strategy. It uses a set of quality management and statistical methods to get the maximum user satisfaction. It is a process in which 99.99966% of the products manufactured are statistically perfect to be delivered which comes out to be 3.4 defects per million.

### 2. Objective

The prime objective of this article is to spread awareness among the library science professionals about the concept of six-sigma and to make their opinion about achieving the maximum user satisfaction through enhancing quality in their services by implementing methodologies of six-sigma.

### 3. Definitions<sup>1</sup>

Bob Galvin of Motorola, Larry Bossidy of Allied Signal and Jack Welch of General Electric developed a framework to make Six-sigma happen.

**3.1. "Six-sigma in Motorola** is considered at three different levels:

1. As a Metric ,
2. As a Methodology, and
3. As a Management System.

Essentially Six-sigma is All Three at the Same Time."

**3.2. General Electric defines Six-sigma** as "highly disciplined process that focuses on developing and delivering near perfect products and services. Sigma is a statistical term that measures how far, a given performance deviates from perfection...At its core Six-sigma revolves around a few following key concepts:-

- Critical to Quality: Attributes most important to customer,
- Defect: Failing to deliver what the customer wants,
- Process Capability: What your process can deliver,
- Variation: What the customer sees and feels,
- Stable Operations: Ensuring consistent, predictable processes to improve what the customer sees and feels,
- Design for Six-sigma: Designing to meet customer needs and process capability..."

**3.3. The U.K. Department of Trade and Industry defines Six-sigma** as "A data driven method for achieving near perfect quality. Six-sigma analysis can focus on any element of production or service and has a strong emphasis on statistical analysis in design, manufacturing and customer oriented activities."(June 2005)

**3.4. Isixsigma Organization** founded in 2000 view "Six-sigma as a rigorous and disciplined methodology that uses data and statistical analysis to improve a company's operational performance by identifying and eliminating the ' defects' in manufacturing and service related process. Commonly defined as 3.4 defects per million of opportunities. It can be defined and understood at three distinct levels – metric, methodology and philosophy..." (July 2005).

Following common elements emerge out of all the above definitions of Six-sigma:-

- Data driven method based on statistical analysis
- A method for achieving near perfect quality/Quality management in production and services
- Improvement of operational performance by minimizing the root causes of defects
- User/Customer centric- User satisfaction

Six-sigma is a cleverly packaged tool compiled by organizing basic tenets of previous quality management techniques and one of them is Total Quality Management (TQM). The TQM is the end product of different methodologies undertaken by an organization with the help of certain defined techniques and variables keeping into consideration the objectives of parent organization during the course of its operations so as to achieve the maximum user satisfaction.

The development approach to TQM<sup>2</sup> involves following steps:-



#### 4. Historical Background of Quality Control Techniques<sup>3</sup>

"The Principles of Scientific Management" published in 1911 by Frederic W Taylor provided a framework for effective use of people in industrial organizations. New department of defect prevention emerged out of this theory which led to quality control. Quality control was introduced to detect and fix problems along the production lines to prevent production of faulty products. It involved inspection which led to measurement, examination and listing of products, processes and services against specified requirements to determine conformity.

In 1920 Dr. W Shewhart for the first time introduced Modern Control chart to manage quality which was later developed by Deming, Dodge and Roming. In 1950's Quality Control (QC) and Management was figured at the centre stage in Japan and for the first Quality Circles were introduced in 1960's where workers met and discussed the issues for improvement of all

work aspects which they shared with the management for the benefit of the organization.

The term Total Quality (TQ) was first used in a paper by Feigenbaum at first International Conference on Quality Control in Tokyo in 1969. A 'Company Wide Quality Control' model involving top management to workers was introduced by Ishiawa.

In 1980-1990's term TQM gained ground in western world taking a clue from Japan's model of Quality control. It involved all employees with a focus on customers. Quality and excellence awards were started in 1980's and International Standard Organization (ISO 9000) became the benchmark for achieving quality. The 1990's witnessed the concept of SIX-SIGMA which was an extension of TQM encompassing cleverly major attributes of it. It demands continuous improvement and integration of management in totality involving whole of organization. In 1991 Motorola in U.S.A., Allied Signal, General Electric in 1995, Raytheon Tuscan at Arizona plant, Bombardier Aerospace in Canada adopted and implemented the Six-sigma methodologies and earned huge profits. In April 2002 Robin Mann and Steve Welch started Business Performance Improvement Resource (BPIR.com) through the Centre for Organizational Excellence Research (COER).

## 5. Literature Survey

Rath and Strong after conducting a survey in 1992 on 500 Fortune companies concluded that only 20% of the Fortune companies are satisfied with the result of TQM processes.<sup>4</sup>

"Is TQM dead" by Scott Madison Patson<sup>5</sup>, in his paper published in Quality Digest in 1994 opined that of the many companies that adopted TQM methods to attain more profits for their organizations, majority of them failed to achieved the fixed targets. In another survey of 300 electronics companies by the American Electronics Association found that 73% had quality programmes in place but 63% said that they had failed to improve quality by even as much as 10%.

George (2001)<sup>6</sup> marked various methods step wise step to achieve the quality targets by showcasing the case of General Electric in his book " The six-sigma revolution : how General Electric and others turned process into profits".

Burns(2006)<sup>7</sup> in "Sick Sigma" raised serious question about the process of six-sigma as it is a specification driven methodology which means with a change in specifications defects are controlled or eliminated. Specifications are set as per the needs or requirements of the customer and not the processes.

Kim(2006)<sup>8</sup> in his work "A study on introducing six sigma theory in the library for service competitiveness enhancement" advocated the application of six-sigma as a solution for efficient knowledge management and better user satisfaction but only a theoretical framework has been provided and no real life solutions have been suggested or illustrated.

Kaushik, et.al<sup>9</sup>, (2007) in their paper "Six sigma applications for library services" viewed six sigma applications still limited to enhance library services and have pointed out a number of critical points regarding qualification and key performance indicators. In their pilot study they have suggested that a tailored six sigma can work for library services.

No concrete method has been provide to evaluate standard deviation by Al Zubi and Basha (2010)<sup>10</sup> in their paper "Six sigma in libraries: A management perspective", however for quality control the authors have suggested plan-do-check and act methodology.

## 6. Six Sigma Methodologies and Library Perspective

Six sigma methodologies is a highly controlled management approach that promises the companies' such yardsticks which would enable them to deliver their best products and services and also to achieve higher profits with an increase in satisfied customers. Two types methodologies are followed in all Six Sigma projects-**DMAIC** and **DMADV** or **DFSS** methodologies<sup>11</sup>.

**6.1.DMAIC** stands for D- Define; M-Measure; A-Analyze; I-Improve; C-Control. DMAIC is targeted to improve existing business processes.

**Define:** It involves defining or finding project goals and sub goals, establishing an infrastructure to meet these set goals and planning to improve present functioning.

**Library Perspective** of Define may involve the identification of target group of library users and the attributes of their age, gender, qualifications or present area of interest and their information needs. The goals can be the kind of services to be provided, method of providing those services, training to users, users' survey, availability of infrastructure for the utilization of information sources etc.

**Measure:** It is the measurement of current processes by collecting different kinds of data and by preparing matrices.

**Library Perspective** of Measurement can be the making out of number of users and kind of collection in any library. Data can also be of information use behavior of the library users, how and from where the information is gathered and what ways are adopted to process it so as to make that information accessible. What are the different formats of information available and what storage media is used for information products are other dimensions of measurement.

**Analyze:** The analysis involves the determination of root cause in the present process by establishing cause and effect relationship.

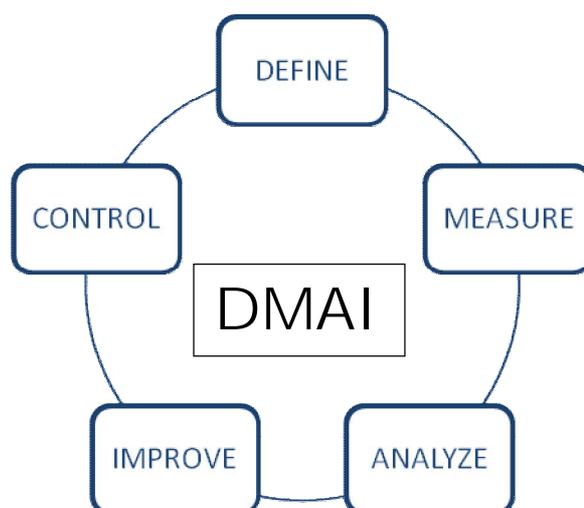
**Library Perspective** of the analysis can be the establishment of what resources are more exploited or are more in demand and why. What are the reasons for underutilization of other information sources and services? Feedback can be taken about present library set up and regarding what new services should be introduced or how the status of existing library products and services can be enhanced in terms of collection, timings, staff etc.

**Improve:** Using data, matrices and analysis of above phases, better techniques are opted in the organization for eliminating root causes of defects.

**Library Perspective** under this phase can be orientation of users towards the library services and resources. User education for improvement through seminars, exhibitions, lectures, library portal, and library website are the best options. User friendly library management software shall be installed and for providing better library services periodic training programmes for library staff and users should also be conducted.

**Control:** It demands continuous monitoring of the process/techniques of all the stakeholders. Regular feedback from customers and people within the organization for improvements are asked for.

**Library Perspective:** The role of top management in compilation and implementation of above phases, especially the feedbacks from library users and people within the organization are necessitated under control. The change in policies for improvements, budgetary provisions and involving librarian in policy decisions are some of the dimensions of control mechanism.



GRAPHICAL PRESENTATION OF DMAIC METHODOLOGY

**6.2. DMADV** Stands for D- Define; M-Measure; A-Analyze; D-Design and V-Verify. DMADV aims to create those products and services that best suits and match the customer needs. It is also called DFSS- Design for Six-Sigma.

**Define:** This phase of six-sigma identifies, determines and sets the organization's goals in accordance with the customer needs.

**Measure:** At this stage the organization identifies and measures those factors that are critical to quality, exactly determines the customer needs and specifications, product capabilities and risk factors.

**Analyze:** Alternative processes are designed and analyzed to meet customer needs along with the existing processes.

**Design:** The best design or model implied from above phases is selected and customized for the organization.

**Verify:** Performance and ability of the selected design to meet customer need is verified.

**Library Perspective** of all the above stages is that the library user is all important and while formulating library objectives and designing library services s/he is to be kept into consideration. Users' feedback and user awareness about the library products and services should be given utmost importance.

### 6.3. Limitations of Six-sigma

Six-sigma has many advantages to its credit and it has been proved by Motorola and General Electricals and the like companies but when this process is implemented in service agencies like libraries many shortcomings may be confronted.

- **Collection of quality data:** The data collection is a tedious job and that too of highest quality. It largely depends upon the willingness of the user and on availability of data. It also has financial implications for any organization. Sometimes the desired result is far from expectations. The gap between costs and results may adversely affect the results.
- **Non application of 3.4 defects/million opportunities:** It sounds improper as far as libraries are concerned because defects may be anything that does not suit or match users' demands and needs. Moreover behavior of library staff, working hours, unwillingness of users to put forward constructive suggestions or needs to be introduced within the existing library system, non-co-operation from library staff to solve the users problems pose a serious question regarding relevance of six sigma in libraries.

- **Dynamism of users' demands and needs:** The advancements in technologies, needs and information seeking behavior of different age groups, races, cultures, groups, working professionals and researchers etc. are never same and similar. The critical total quality of today may not be applicable in true sense tomorrow.
- **Theoretical and subjective in nature:** There is no specific tool to ascertain the exact and real goals of any organization and there is no provision for any pin pointed procedures that may be adopted to achieve the set goals.
- **Lack of linkage between six sigma and organizational work culture:** Six-sigma has combined methodologies for production and service sectors whereas it needs to be separated because the organizational culture is different in for both the set-ups. The training and learning needs a redressal as per organization's culture.
- **Merely a specification driven methodology:** Counting of defects in six sigma relates to specifications. Defects are controlled with the change in specification and these specifications are again changed as per customer needs and it does not talk about processes to be altered or followed with a change in specification.
- **Lack of originality:** Since six-sigma is a quality management technique which measures standard deviation from the standards/ specifications set to achieve quality with regard to products and services, it has imbibed the entire theoretical framework from earlier quality management methodologies, such as TQM. It is the summation of all earlier techniques.
- **Basis of human nature and perception:** Six sigma advocates the achievement of user satisfaction which is related to human behaviour and there are no set standards to measure the human perception at a given time. It differs from situation to situation and from time to time.

## 7. Conclusion

Six sigma statistical principles are a series of inter-connected processes, identifying, controlling and reducing variation which ultimately provides an opportunity for further improvements in the performance of an organization<sup>12</sup>. There is an urgent need to bridge the gap between theoretical assumptions and its practical implementation in service agencies, especially the library and information centres. The tailored made six-sigma methodology as per the needs and requirements of library and information services may be beneficial but the library and information science professionals are required to be educated at least in Indian scenario if the benefits of Six-sigma are to be reaped.

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