

## Quality of Quality Definitions –An Analysis

M. Pradeep Kumar<sup>1</sup> , Dr. N.V.S. Raju<sup>2</sup>, Dr. M.V. Satish Kumar<sup>3</sup>

<sup>1,3</sup> Department of Mechanical Engineering, KITS, Karimnagar, TS -India

<sup>2</sup> Department of Mechanical Engineering, JNTUH CE, Karimnagar TS -India

<sup>1</sup>pradeepjnkr@gmail.com, <sup>2</sup>enviousraju@gmail.com, <sup>3</sup>satishkitss@gmail.com

**Abstract:** *The standards of any product, service or an organization can be characterized by the term “quality”. In the past, there was no clear definition established to define the term “quality”. From few decades, philosophers such as Feigenbaum, Deming, Crosby, Ishikawa, Juran, Taguchi and others have put their thought to define the term quality and also accomplished to the quality management principles. The contributions of their philosophies have enlightened the engineers and managers to focus on the performance. Every engineering concern like manufacturing, materials, design etc., are merged and linked with the citation of quality and directing their path to achieve a good quality product or a service. Quality management has extended its bounds and grown to new heights that it has become a separate area in every field and emerged as “total quality management” which is popularly abbreviated as TQM. To understand the movement of TQM, there is a need to oversee at the philosophies of quality leaders who configured the evolution of TQM. As a tribute, this paper is devoted towards a good understanding regarding philosophies and teachings of Quality Gurus and their approach towards quality management.*

**Key Words:** Quality, TQM, Quality Management, Quality Gurus

### I. Introduction

The word quality came into existence over many years ago, though there was no aptful definition. Its meaning has been changing time to time. During world war-II quality became a need full dimension to nature. Many techniques were used to evaluate the quality and to monitor the production, process control charts were used. Quality gurus led the wider meaning during 1960's. Till then, the quality was observed from the production process view, thereafter a conclusion has been drawn that the quality can also be practiced to the entire organization. From business point of view, the quality meaning has changed dramatically in the year 1970. Before these quality is viewed as the inspection of the product. From 1970 onwards, the competition has grown on the quality management to gain the interest of every manager and engineer. Every organization started focusing on the quality improvement to their products to gain the market than their competitors. Providing high quality for a product or a service has become a strategy for achieving the greater market and also become a necessary tool in every organization. Therefore, to measure the performance of a business quality standard is essential.

There were many old conceptualizations regarding quality. However, no clear cut path was made to put all the concepts in order. Due to the enhanced demand on quality, the philosophies of quality gurus are made in an order and all the

philosophies have been focused as total quality management. Producing the right products and service at the first time and every time is one of the philosophies of TQM. This goal can be attained by best practicing TQM tools and techniques continuously wherever, whenever required. The concept of TQM suggests that everybody in the organization should be involved to improve their skills, knowledge, and perfection to satisfy their immediate customers or internal customers. In this customer satisfaction chain, links should become strong and robust by satisfying each internal customer and finally the ultimate customer. In order to understand the movement of TQM, there is need to understand the philosophies of notable quality gurus who have moulded the deepening of TQM. Their teachings and obligations made to cope the knowledge and understand the quality today.

### II. The definitions of quality

Based on the perspective of the humans, the definition of quality may vary. Different perspectives have been derived from last 3 decades to understand the term “quality”. Every customer established some needs and these needs should be transformed into measurable characteristics. The final aim is to make the customer satisfied for what he paid for a service or a product. Some of the definitions are as follows:

- Quality is fitness for the purpose
- Quality is degree of customer satisfaction
- Quality is accuracy in meeting the specification or design
- Quality is meeting the standards or norms
- Quality is degree of excellence

### III. Quality gurus

A guru is someone who has the reputation as an expert leader, teacher or practitioner in a particular field. However, the characteristics of a Quality Guru certainly should be all of these. Moreover, a Quality Guru is a phenomenal individual whose way of approaching and conceptualization the quality toward a business strategy has made a remarkable impact. The concepts of quality gurus included to cover the historical period from World War II.

Major philosophies and tools which primarily focuses on quality were developed, which includes technical tools to control industrial design and manufacturing such as contributions of Ishikawa, Shingo and Taguchi. Gurus also included the management principles to achieve the greater quality, such as the Poka-Yoke approach of Shigeo Shingo, Zero Defect concept of Philip Crosby etc.. This paper snaps the profile of quality gurus and briefly explains the major philosophies of them. Figure 1 shows the quality wheel.

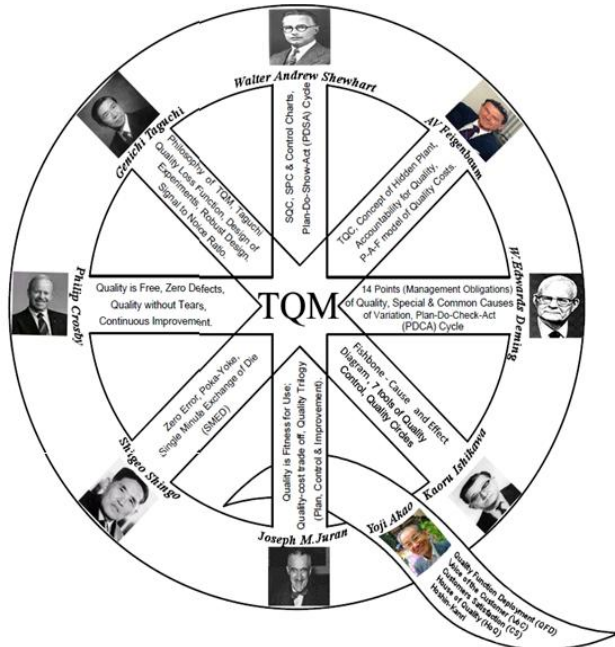


Figure 1: The quality wheel

**Walter Andrew Shewhart -The Father of Statistical Quality Control**

At the time of industrial age stepping into the second century, a young philosopher Walter A Shewhart brought a revolutionary change in industrial era. Walter Andrew Shewhart done his bachelor’s and master’s degree from the University of Illinois and from the University of California at Berkeley. He received his doctorate with the thesis on physics during 1917. In 1918 he started his career as an engineer at western electric and continued till 1924. Later, in the year 1925 he joined at Bell telephone laboratories and held the service in various cadres and continued the same till his retirement in 1956. Walter A Shewhart called upon by the government of India and United nations for his service in the war department.

Walter Andrew Shewhart popularly known as father of statistical quality control successfully brought the paths of various disciplines such as engineering, economics and statistics on to the one desk. One of the Shewhart’s greatest inventions is control charts (during 1924) have hiked as one of the greatest contributions to the philosophy of science. The credit of emphasizing the probability theory as the tool of the statistician was made by Shewhart. Based on his four lectures which were given in the Washington during 1938, his book titled “Statistical Method from the Viewpoint of Quality Control” published and introduced Shewhart to the world as a statistician. Shewhart’s work focused on reducing variation in a manufacturing process and the continual process adjustment to retort the non-conformance that actually increases variation and degrades quality. The major contributions of Shewhart are as follows:

**a. Statistical quality control (SQC)**

In every production process, it requires to monitor the process in order to ensure that the product to be in quality. SQC charts are the techniques which fulfils these requirements. The main objective of the SQC charts is to control the process and to

gain some idea about what is happening in the process. These charts are the graphical representation and these techniques simply aim to achieve the production of higher degree of quality services and products. Under SQC, there are seven elements which help in monitoring and understanding a process, and these are termed as seven tool of SQC. They are (i) flow charts (ii) check charts (iii) pareto charts (iv) scatter diagrams (v) control charts (vi) cause and effect diagram and (vii) run charts. SQC charts can be classified as shown in the figure 2.

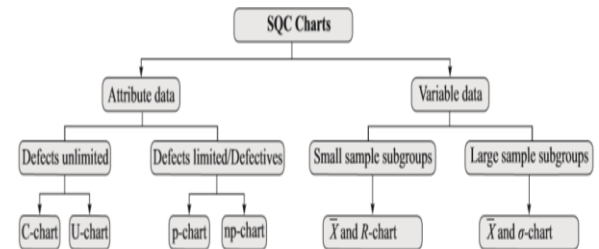


Figure 2: Classification of SQC Charts.

**b. Statistical process control (SPC)**

There are two sights in Statistical process control (SPC) to ensure the products quality during manufacturing process. They are 1. Acceptable of specifications 2. Uniformity in producing the items. These can be achieved through control charts, which compare the process performance data graphically. Control limits act as limiting lines on the chart.

**c. Process Capability**

The ability to achieve measurable results from a combination of machines, tools, methods, materials, and people engaged in production is the theme of process capability. In order to understand the concept, one should have the knowledge of control charts and its relationship to the normal curve.

**d. Control charts**

As every process have some variations, these charts distinguishes the common causes and variation, that it indicates whether the process is under control on not.If it is under control then no changes to the parameters are to be made. If the process is not under control, improvement should be needed. One goal of using a Control Chart is to achieve and maintain process stability.

**IV. Joseph Moses Juran-The Quality Trilogy to Plan, Control, and Improve**

Juran graduated in electrical engineering and law. He served for various positions as an industrial executive, engineer and also as a professor. During 1920’s, juran worked at Hawthome electric plant in Chicago, and taught at New York University. The most howling book from the pen of juran is the “Quality Control Handbook”. Its original edition was published in 1951, and four editions were published till now. The Quality Control Handbook became the standard reference work on quality control and established Juran as an authority on quality. As an honour to his dedication towards the quality, Australian organization for quality control has introduced the juran medal in 1975.

According to juran’s definition, quality is “fitness for use”. Which means the product or a service should be designed to meet the customer’s need. Second definition of juran’s is products or service free form deficiencies. Juran differentiates the product features and product free from deficiencies. The

deficiencies may make the customer trouble and that leads to the dissatisfaction of customer. In other words, the degree of closeness of a product or a service to its specified use is a measure of quality. The Juran's approach in viewing the defects is quite different. He advocates all the problems as projects, and if these projects are rectified and corrected in order as project by project, an improvement can be done. Juran's project-by-project approach is more impressive as it helps in improving the standard and the quality. He opined that the quality can be improved by looking at the customer's need and his main consent was in solving a problem and elimination of the causes to those problems. He identified the three cyclic key points, viz., planning, controlling, and improving which he called trilogy which mainly concerns problem solving and removal of problem causes. Thus, Dr Juran's trilogy stands on three pillars, viz., quality planning, quality control, and quality improvement.

### 1. Quality Planning

Quality planning starts with a question, for whom you are planning? It's simply a customer. The main focus of quality planning lies in identifying a customer, also in locating and detecting a customer. This leads to several questions as

- Who is the customer?
- Where is this customer?
- What are his needs?
- Why does he need this product/service?
- When does he need the product/service?

JURAN'S QUALITY TRILOGY



Figure 3: Quality Trilogy

### 2. Quality Control

The second part of Juran's trilogy is concerned with "quality control" which is concerned with the assessing, appraising, and ascertaining the process parameters or performance. The quality control also stresses on correcting the defects.

### 3. Quality Improvement

Juran's third focal point is "quality improvement." The improvement can be achieved through the following steps:

- Project the need for improvement.
- Point out specific programs for improvement.
- Predict the causes.
- Provide remedies.
- Prove that the remedies are effective.
- Provide control to maintain the gain.

## V. Kaoru Ishikawa -One Step Further

Kaoru Ishikawa graduated from the University of Tokyo. Then after, he joined in the Navy as an acting officer at the beginning of World War-II in the Japanese team. During 1943, he came out of military and worked for Nissan liquid fuel

company up to 1947. After he started working as an associate professor at university of Tokyo. ASQ named a national medal after him in 1993, recognizing him as a "distinguished pioneer in the achievement of respect for humanity in the quality disciplines." Lastly in 1978 he became the president of the Musashi Institute of Technology.

Ishikawa ideology focused that the quality improvement is a continuous process, and it can always be taken one step further. He was the first quality guru to stress the importance of total quality control of an organization, rather than just focusing on products and services. Ishikawa also enlightened the importance of the "internal customer," the next person in the production process. He believed that the company's vision and the goals should be shared by each and every worker in the organisation and the unity among them enhances the standard. He popularly knew for his implementation of *quality circles*, which are small teams of employees that volunteer to solve quality problems.

The first contribution of Ishikawa is transforming the Deming's PDCA cycle into a six step plan. Ishikawa identified and showed the importance of seven tools of quality. His seven quality tool includes control chart, run chart, histogram, scatter diagram, Pareto chart, and flowchart. The most popularized and widely used seventh quality tool of Ishikawa is the Fishbone Diagram, Commonly known as the *Cause and Effect diagram*. This is the most notable of all of Ishikawa's contributions to the field of total quality.

#### a. Cause and Effect diagram

These diagrams are intended to find out the principle causes and their effects on the system and help them to solve the problem towards the most likely causes of observed defects. These diagrams are structured with the central bone as problem statement, side bones as the major categories of causes and sub-bones as detailed causes. These diagrams can be classified as (i) Cause enumeration (ii) Dispersion analysis (iii) Process analysis

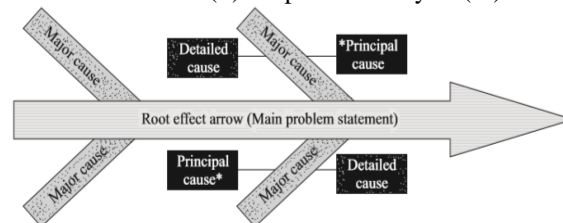


Figure 4: Cause and effect diagram

#### b. Quality circles

Quality circles are small teams consisting of employees, who are directed to discuss and solve the quality problems. This is another great contribution of Ishikawa. After the cause and effect analysis, organizations and engineers should think of eradicating the causes. So, the underlying principle of guiding the working of a quality circle is that the members of quality circles are the best to know about the problem. A circle usually consists of a maximum of 10 members. Their supervisor or a senior among the group members works as a leader. The leader of a "quality circle" aims toward educational development of their members.

## VI. Walter Edwards Deming -Management Obligations and Pride of Workmanship

Walter Edwards Deming the father of 3<sup>rd</sup> wave of the industrial revolution is basically a statistician by experience. Deming associated with Walter Shewhart at bell labs and Hawthorne plant. He obtained his Ph.D from Yale University in the thesis of physics. He is a lecturer, educator, author, and an internationally renowned consultant, best known for leading Japanese businesses on the course that has made them leaders in quality and productivity throughout the world.

Many philosophers have defined quality in a single phrase, but Deming made his definition to quality in several phrases. He views that the products quality can only be defined by the customer and may change in meaning depending on their needs. In order to reach the customers benefit, managers, administrators and decision makers must sense the significance of consumer research, statistical thinking, and the application of statistical methods to processes. For this, the organization must be dedicated to creativity and innovation in every area such as manufacturing, design and sales with the focus on long term goals and a little attention of the short term gains. Without, this leads to the poor quality of products and a level of delay in the service. Extrapolating the writings of Deming, his ideology would emphasis on quantitative methods, the application of which results in products having

1. Degree of uniformity resulting from reduced variability
2. Less price
3. Suitable for the market

Dr Deming focuses on “pride in workmanship” which is essential to obliterate the barriers that forefend the workers’ right to pride of workmanship. Dr Deming’s philosophy is best illustrated with his 14 points. These are also known as management obligations, which must be totally clenched management to implement his philosophy. These points followed by summarized explanation are given below. Summarily, Prof. Deming stressed on the management obligation on

- Constancy in improvement
- Continuous innovation
- Education and training
- Workers right to take pride of workmanship
- Continuity in the process of transformation



Figure 5: PDCA Cycle

### "Plan-Do-Check-Act Cycle"

Deming strongly believe in his management obligations which emphasizes on continuous improvement. The concept of ongoing improvement is illustrated by the Deming’s plan–do–

check–act (PDCA) cycle [originally, it is proposed by Shewhart as plan–do–show–act (PDSA) cycle], often called the “quality cycle” is a very powerful and helpful methodology that can be used for any process improvement at any stage and at any level. Even though Dr Deming gave credit to Walter Shewhart for inventing it, the cycle became more associated with Deming because he recommended and popularized it in Japan. The cycle consists of continuous cyclically repetitive four primary stages:

**Plan:** to decide the most effective initiative to work

**Do:** to follow the plans established in the first stage

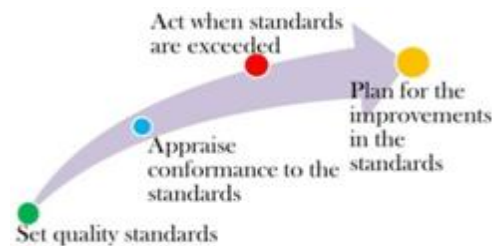
**Check:** to ensure the effects of second stage

**Act:** to modify any deviation occurs

### VII. Armand Vallin Feigenbaum-Hidden Plant Behind TQC

Feigenbaum argues that diagnosing of all the customer needs and requirements should be the initial point of the quality chain and ends when the customer remains satisfied after receiving the product or service. Thus to attain the functions of a quality chain, all the organizational activities from manufacturing to marketing, purchasing to production, inspection to shipping should attain in a greater quality. He argued that quality is the single most important force that can lead to organizational success and company growth in national and international markets. Feigenbaum describes quality control as a management tool to achieve quality through the following four steps:

- (1) Design the quality standards
- (2) Appraise conformance to the standards
- (3) Act when standards are exceeded
- (4) Planning for improvement in the standards.



### Total quality control

It is an impelling ideology by Feigenbaum which fusions the quality improvement, development and maintenance of different associations or groups in an organization in order to equip the bound of service and production at the most efficient and economical grades that satisfies the customers. Understanding the phrase “total quality control” and considering each word, each words definition to TQC can be understand by the following brief description.

**Total:**Feigenbaum opined that each and every individual in the organization maintain the total attention and involvement to ensure quality. At all stages of organization and at all the departments and sub departments, should have to ensure the quality based work and service in order to provide a qualitative product to the customers.

**Quality:**Feigenbaum said that, “Quality is, in its essence, a way of managing the organization.” In the view of Feigenbaum,

quality is the customer based activity of the organization and required high defined way of activities to be conducted in a disciplined way, so that the quality outcome is uphold at the extremities of customer possibilities.

The core ideology of Feigenbaum's systematic approach is summarized using the following concepts of quality:

- Quality requires individual and teamwork zealotry.
- Quality is what the customer says it is.
- Quality is a way of managing.
- Quality and cost are a sum, not a difference.
- Quality is an organization wide process.
- Quality and innovation are mutually dependent.
- Quality requires continuous improvement.
- Quality is an ethic.

**Control:**Feigenbaum viewed control as a responsibility devolution.Feigenbaum defined control as a process for delegating responsibility and authority for a management activity while retaining the means of assuring satisfactory results He described four steps to develop control in a process:

1. Setting the quality standards.
2. Appraising acceptance to the standards.
3. Act when necessary.
4. Planning for enhancement in the standards.

#### **VIII. Shigeo Shingo -Make Mistake-Proof, Not Foolproof (Poka-Yoke)**

The philosophies of Dr. Shigeo Shingo and his contributions towards quality improvement has laid the backbone for the Japanese industrial sector and revolutionized the industries in the west. Just-In-Time (JIT), and the Toyota Production System were developed and conceptualized by Shingo during 1959 in which he honoured as an "engineering genius" for his work. One of his appraisable approaches which recognized Shingo as a reputable Industrial Engineer is, he reduced the setup time from 4 months to 2 months, while working on the hull assembly on a 65,000-ton super tanker, at Mitsubishi Heavy Industries, which made a new record in shipbuilding. Another concept from the ideology of shingo is Zero defect, which is also popularly known as poka-yoke or mistake proofing which focuses on eradicating the errors and mistakes which produce defective products. During 1970, Shingo incorporated his knowledge for the most revolutionary concept in manufacturing known as "Single Minute Exchange of Dies" (SMED) which aims at reducing the setup time. His philosophies were adopted and applied by various plants to improve productivity and minimize the work in process inventory and also the part defects.

Shingo is associated with three famous equations

- Single Minute Exchange of Die (SMED)
- Poka-Yoke
- Just in Time

#### **a. SMED**

SMED led the most effective way to reduce the fixed cost associated with the setup and changeover of dies. So, by using this method set up time is reduced so large lot sizes are no longer necessary to achieve machine operating efficiencies. This concept results in higher productivity as it allow for higher machine utilization. One of the beneficial features of SMED is quick adjusting to the design engineering changes with minimal

cost. In the consent of SMED, Shingo identified the setup time as two entities 1. Internal and 2. External setup. In the first type the operations can only be performed when the machine is stopped whereas in the second one, operation can performed while machine is running.

#### **b. Poka-yoke**

It ensures 100% inspection so that no defective products are passed to the stage of next process. Considering an example, if a hole is to be fit on to the shaft, with the help of jig or fixture it can be known whether the hole can properly assembled or not. If the hole doesn't fit properly, it is not made to specification and is therefore defective. Therefore, Poka-yoke simply refers to "fool-proofing" a process.

Generally there are three types of poka-yoke 1. Contact method 2. Motion step method 3.Fixed value method. In the first type, defects can be identified whether the contact is properly made between the components and other parts of the products. The second type determines whether or not the steps or motions of a procedure are followed. The third type determines whether a given number of movements have been made.

#### **c. JIT**

JIT concept focuses on keeping a small quantity of stock required for the production or a process which can be used with the daily or hourly scheduled delivery fails. That is, the material required for each process is supplied in required quantity, at required time and with the required items. The supply of materials for the process will enter directly to the production line without storing. In Japanese, the word for just-in-time actually means "timely", "well-timed" or "just-on-time."

This concept has been implemented to the new "continuous improvement" or "lean manufacturing" wave in the industry today. The preliminary goal of JIT lies in implementing the system for obtaining the competitive benefits and to enhance the productivity by eliminating the following wastes.

- Abundant inventory
- Waiting time
- Over production wastage
- High transportation

#### **IX. Philip B. Crosby -Zero Defects and Quality is Free**

Philip B. Crosby was known for his notable concept "Zero defects" and also a globally known quality leader. Crosby severed as a director of quality and corporate vice president of ITT Corporation for fourteen years. Before this, Crosby worked as a junior technician in a quality department and led several different positions in various organizations till he became the director of quality. His concept, "Zero Defects" was originated during 1960s while he is working with Martin Marietta Corporation in the United States. In 1979, he founded Philip Crosby Associates Inc. (PCA), which in the next 10 years grew into a public traded organization. Crosby's book Quality is Free was sold over two million copies and became a best seller in the field of management. Quality without tears is another best seller.Prevention is the basic ideology of the crosby's approach. His philosophies towards quality are best understood by the following concepts.

1. Do It Right First Time-Do It Right Every Time (DIRFT-DIRET)
2. Zero defects

3. Four absolutes of quality
4. Six C's

### 1. Do It Right First Time-Do It Right Every Time (DIRFT-DIRET)

He believes that prevention is the path that leads to achieve the quality and is not by sensing and experimenting. So he stresses on doing the things right at the first time and every time. According to his approach any product that falls within its design specifications is a quality product. Each and every organizations view and the perception about the quality have to be changed. *Crosby found that it is a common attitude of managers to believe that errors are inevitable, and a common part of business life and one need to cope up with that.*

### 2. Zero defects

The zero-defect concept is a formula for a management program which seeks the voluntary participation of work-people in undertaking personnel responsibility for the quality of the task in hand. It is an approach to the problem of securing a high level of error-free work performance. Zero-defects program demands the employees and employers to make zero defect a slogan. The meaning and intension behind this act is that once the employees take it as a slogan, they obviously digest it and build a no-defect production culture. Further, the term adopted as a kind of banner motivates, reminds, alerts, and prompts the company, its employees, and managers to improve quality.

### 3. Four absolutes of quality

Quality improvement begins with what Crosby calls for the four absolutes of quality management, considered by him to be the core concepts of the quality improvement process. The four absolutes are:

1. Quality means conformance to requirements, not goodness.
2. Quality is achieved by prevention, not appraisal.
3. Quality has a performance standard of zero defects, not acceptable quality levels.
4. Quality is measured by the price of non-conformance, not indexes.

### 4. The 6 C's

Crosby argues that every organization should undergo through a process to maintain a zero defect product or a service, that he call it as 6 C's. The first C stands for the *comprehension*, which means each and every employee must understand what quality is. The second C is the *commitment*, which represents each representative in the organization from labour to manager should establish a quality policy and must be committed. The next C is *competence*; education and training to implement the quality improvement. The fourth C is communication; by this the understanding of quality by all the people can be achieved. The fifth is *correction*, which focuses on, prevention and performance. Finally, the sixth is *continuance*, which emphasized the process must become a way of life in the organization.

### X. Genichi Taguchi: Practical, Rapid Quality Methods

Genichi Taguchi Was born on January 1, 1924. Taguchi began his studies in textile engineering at Kiryu Technical College. In 1942, Taguchi's draft notice built an interest in statistics. Under the guidance of Prof. Masuyama, the then best statistician, his statistic skills were nurtured. He worked for the Institute of Statistical Mathematics (1948-1950) and gained

recognition for his industrial experiments connected with the production of penicillin. He was hired by the Electrical Communication Laboratory (ECL) in 1950, despite SQC was so popular in leading Japanese companies. He visited the Indian Statistical Institute during 1954-55 where he had the opportunity to interact with C. R. Rao, Ronald Fisher, and Walter Shewhart. He received a PhD in Science from Kyushu University in 1962. Two years later, after his Ph.D. in Science, through the second edition of this book, he introduced industrial research on the signal-to-noise ratio. He left ECL, but maintained his relationship as consultant.

After the world war-II, Japan was in a situation that there were very limited resources available for the manufacturers. Japan is fortunate to have some great engineers and philosophers such as Taguchi, who revolutionized the manufacturing process in Japan through cost savings. Dr Genichi Taguchi's approach uses statistically planned experiments for parameter design. In this approach, experimental design or design of experiments (DoE) is regarded as an important tool for enhancing quality and increasing productivity. Taguchi methods depend mainly on the following three conceptual features:

1. Quality loss function (QLF) or Taguchi loss function (TLF)
  2. Quality robust design (QRD) through design of experiments (DoE)
  3. Noise and signal-to-noise ratio (SNR).
- ### 1. Quality loss function (QLF) or Taguchi loss function (TLF)

Taguchi has made a new differentiation to define "quality". Till then quality has viewed in a positive approach. Taguchi looks quality from a negative angle, i.e., as "the loss incurred by the society right from shipment of the product." He identified this new angle that causes the loss, i.e., the cost of dissatisfaction of customer, which in turn may lead to loss of reputation and goodwill of the firm. In fact, this is a hidden cost. Therefore, it is the loss to the firm in the form of loss of market share and increased marketing efforts needed to overcome lack of competitiveness in addition to the direct loss arising out of warranty and service costs.

### 2. Design of Experiments

The design of experiments is a series of techniques to optimize product/process design and process operation, and limiting the effect of noise (uncontrollable) factors. It involves in the identification and control of parameters that have a potential effect on the performance and reliability of a product design and/or the output of a process. The objective of this approach is to determine the value of these design parameters that make variation resistant system performance. The concept can be applied to the design of both new and existing products and processes.

### 3. Noise

The term "noise" has a special reference in Taguchi's approach. He defines noise as unwanted element or factor that causes loss of useful energy. Simply, it is the result of a factor that adversely affects quality which is generally assumed to be caused by an external source. And it should be obviously reduced to the maximum extent possible.

### 4. Signal-to-Noise Ratio

Signal-to-noise ratio (SNR), proposed by Taguchi, is very useful for calculating the target value for the response. It is the ratio between the mean (average) and the variance. The signal-to-noise ratio measures “s/n” ratio, where s is the process mean and n is the standard deviation.

#### XI. Finally what is quality?

This paper started with the some definitions of quality, and we have scanned various philosophical definitions to formulate the correct one. But no philosophy could give us a satisfactory definition. Although many theories and philosophies have been formulated, no single theory could satisfy all. Then shall we conclude all these definitions are waste and useless? Is the question “what is quality?” answerless? Though all these definitions seem to be correct in some occasions, it further created a confusion what definition is to be applied to which product or service. So, we need to develop a definition that can answer any situation combining all these philosophies. Thence, a comprehensive and perspective thinking is required to develop such a definition.

#### XII. Conclusion

In this paper, a brief history regarding the evolution of TQM and the philosophies which made impact on quality movement have been presented. At an outset, after referring the various philosophical definitions, no philosophy could give a satisfactory definition. Every individual guru has his own insight into the quality. Starting from W.A Shewhart, developed the SQC charts which helps in monitoring a process and to understand what is happening in it. If one can establish a standard for quality, using SQC charts it becomes easy to estimate the progress of a product or a service. Elimination of causes to a problem which minimized the product quality is the core ideology of Juran’s Philosophy. He stated quality as fitness for use; which implies product must be designed to reach the customer’s need. Quality circles and cause and effect diagram are the contributions of Ishikawa which serves in finding out the principle causes and their effect for a problem and solving these problems using quality circle. According to Deming, customer is the source to define the quality of a service or a product. This connotes that as there are many customers, many definitions can exist. So Deming clarifies that, uniformity in achieving the customers’ expectations about quality is the prime hypothesis of quality management. Deming also focuses on the continuous improvement, which is described by his Plan-Do-Check-Act cycle also called as quality cycle. A.V Feigenbaum proposes Total Quality Control as a management tool, which is most vital element that leads to the growth of organization. These can be achieved by total attention towards quality and directing this quality as a responsibility. The concept of SMED, Poka-Yoke and JIT was led by Dr. Shigeo Shingo. SMED concept minimizes the changeover of dies and the cost associated with the setup. Poka-Yoke emphasises on 100% inspection to ensure zero defects and JIT highlights on storing a small quantity of stock which is required for the production. Philip B. Crosby associated with the zero defects, which makes the employees to make zero defect program to build an error free work performance so that a product can be produced with zero defects. He is also famous for his book “Quality is free” which is the best seller in the management field. Taguchi is known for his design

of experiments which is used to optimize the process or product design. He made a different approach in defining the quality, which can be stated simply as “the loss incurred by the society”. The cluster of all these philosophies that aims towards greater quality has been designed and studied under the Total Quality Management.

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