Module I. Introduction to Quality Management

Lecture – 1 How the concept of Quality Management evolved over time?

From ancient time, quality of goods and services are monitored directly or indirectly. If we look at construction of the pyramid, Greek ancient arts, crafts, and architectures, Roman-built cities, it clearly demonstrates artists and engineers commitment for achieving the excellence in quality. However, till 1800, production of goods and services was primarily done by small group of individuals. These small groups were often family businesses. Thus, the standard of quality was controlled and set by individual who was in turn also responsible for producing the item. This phase, comprising the time period up to 1900, is called the period of ‘Operator Quality Control’. The entire product was manufactured by a single person (or operator) or by small group of persons, who essentially controlled quality. Thus, controlling and improving quality of the product was aligned with the philosophy of pride in workmanship.

From early 1900s to 1920, a second phase evolved, which called the ‘Foreman Quality Control’ period. In this phase, the concept of mass production with little emphasis on personal accomplishment at work place was introduced. Supervisors are responsible to ensuring that quality was achieved. Foremen or supervisors controlled the quality of the product, and they were also responsible for the shop floor operations.

The period of 1920 to 1940 saw the next phase of quality. This phase was so-called ‘Inspection Quality Control’. With more complicated products and processes it became impossible for to keep close watch over individual stages of operation. Inspectors were assigned to check the quality of a product after processing. Individual product standards were set and any discrepancies between standard and actual product features was reported. Defective items were set aside as scrap, and few items with minor defects are reworked to meet the specified standard or specification. In this period, statistical process control aspects of quality were also popularized, and gained widespread application in industries. In 1924, Walter A. Shewhart of Bell Telephone Laboratories introduced the concept of statistical charts to monitor variability of product characteristics. These charts were called control charts. In the latter half of 1920s, H. F. Dodge and H. G. Romig, also from Bell Telephone Laboratories, proposed acceptance sampling plans
for inspection. These plans substituted the concept of 100 percent inspection. During 1930’s
application of acceptance sampling plans was in full flow in industries. In 1929, Walter
Shewhart with the help of American Society for Testing Materials (ASTM), American Society of
Mechanical Engineers (ASME,), American Statistical Association (ASA), and Institute of
Mathematical Statistics (IMS) created the joint committee for the development of statistical
techniques for application in engineering industries.

The phase of ‘Statistical Quality Control’ was between 1940 and 1960. During World War II, the
principles of sampling inspection plan was extremely useful. The American Society for Quality
Control (ASQC) was formed in 1946. A set of sampling inspection plan for attributes, so-called
MIL-STD-105A was developed in 1950. These plans underwent various modifications, viz.
1957, a set of sampling plans for variables called MIL-STD-414 was also proposed. Juran
published his Quality Control Handbook in 1957.

Use of quality control procedures and benefits of statistical quality control was not explored in
most of the U.S. industries. This may be due to monopoly market. However, Japan after World
War II, embraced the new philosophy wholeheartedly. Edwards Deming was invited to Japan
during 1950, and Japanese engineers were convinced about the importance of statistical quality
control as a means to gaining competitive advantage in world economy. Another quality guru, J.
M. Juran, visited Japan in 1954 and further impressed upon the strategic role that management
plays to achieve end quality. Thus, they started to develop strong commitment to train and educate
their employees on statistical process control.

The next phase of quality during 1960 is known as Total Quality Control. An important feature
during this phase was involvement of several departments and personnel in the quality
development process. Prior to this period, the attitude was quality is the responsibility of the
inspection. In 1960s, there was a change in this attitude. Employees began to understand that
each department within an organization has a contribution to build quality in an item. Concept
of zero defects, which encircle around achieving productivity through worker involvement,
emerged during this period. With more or less same underlying philosophy, quality circles were
introduced in many Japanese industries. The concept of quality circles is based on participative
or team work style of management. It believes that quality and productivity can be achieved through informal group discussion, decision, and pertinent action.

1970 is the phase of ‘Total Quality Management’. This phase involved the participation of everyone in the organization, from the operator to supervisor, manager, and even the chief executive officer. Quality was responsibility of every individual. Feigenbaum, another quality guru, defines the philosophy as:

‘A quality practice that is agreed on companywide and plant wide operating work structure, documented in effective, integrated technical and managerial procedures, for guiding the coordinated actions of the people, the machines, and the information of the organization in the best and most practical ways to assure customer quality satisfaction and economical costs of quality.’

1970 also marked the extensive use of a graphical tool known as the cause-and-effect diagram. Also in this decade, G. Taguchi of Japan introduced the concept of robust design in statistical experimentation.

During 1980s, various quality control and statistical software came into the market. The notion of a total quality management increased the emphasis on supplier’s quality, product design, quality assurance. Ford Motor, Daimler Chrysler and General Motors Corporation adopted the quality philosophy and insisted supplier to adopt various quality control and quality improvement techniques.

In 1989, Motorola started the Six Sigma initiative, a quality philosophy driven by statistical approach for decision making, which within 10 years was sincerely adopted by various other companies.