CHAPTER I

INTRODUCTION

“Quality control begins with education and ends with education”

- K. Ishikawa

When people’s literacy level increases, correspondingly their awareness of the quality of consumables also increases. The quality of the product is based on the perfection in the manufacturing process. Perfection comes from knowledge, skills and the ability of the worker who is involved in making the product. It is the responsibility of the management or the organization to keep the workers or make them knowledgeable and skilled. So the organisation, which is very particular about the quality of products should have a good organizational climate by providing all necessary infrastructure, and inducing the workers to work perfectly.

Globalisation has narrowed down the gaps between countries, people and societies. Whatever be the products manufactured and available in other countries they are made available easily in our country. It results is competition among the corporates. Quality is the most important factor in facing competition. The present trend of the people is to go for good quality products and they are never bothered about the price. Quality plays an important role in meeting the market demands.
Quality is one of the important factors in branding the product and the company. It is thus decided by the perfection of the product.

The responsibility of the company lies not only in manufacturing good quality products, but also, in taking necessary steps to produce the goods in sufficient numbers and to make the goods available in markets for the consumers. So the production function also is very much important in the process. All these processes are carried out by the Human Resource (HR) control. When the HR function is systematized, the expected results could easily be achieved.

Since it involves Human Resource, managing the human work force, is very essential to keep them on their toe by giving them all necessary support and satisfying all their needs to keep them happy and free from stress and worries.

When the literacy level increased, cultures mingled, people’s awareness went up, and life styles changed. These latest developments, resulted in some of the motivational factors not working at all. There may be some intangible factors, apart from the ones already developed by experts previously.

So far managements have enforced some of the motivational factors either directly or through the unions. But it satisfied only a few workers fully. Also the managements tried very hard to implement various types of organizational development strategies with the workers. To get rid of all these cumbersome
processes, a new strategy called “quality control” was evolved in the latter part of this 20th century.

**Competitiveness**

Organisational competitiveness contrasted with individual competitiveness is established by strategic planning and execution of plans by synergising the efforts of people. All organisations have a culture of their own and establishment of competitiveness by the modern organisations, equipped with talented and competitive manpower, calls for efficient leadership and team-building skills. People development and retention, getting the best out of each employee by promoting conditions for competitiveness among them to get the best output, yet ensuring team effort and interdependence in an atmosphere of camaraderie, is a challenge for the progressive organisation. Grasim declared ‘people’ and the ‘expertise’ of L & T as the reasons for the strategic decision of acquiring Ultra Tech. Clearly, it is the precious human resource that commands value in the present environment.

Human resource function and people management are the key success factors in the modern era, be it the case of infrastructure industry, a BPO, a KPO or a service organisation like Event Management Company or an R and D Organisation. Companies have to build strategies around people. Because, it is
knowledge economy we are working in and the aim is to create sustainable business.

“According to Swami Vivekananda, it is the cause that produces the effect; the effect cannot come by itself; and unless the causes are exact and proper, the effect will not be produced. If we take care of the cause, the effect will take care of itself. The realization of the idea is the affect.

The means are the cause; attention to the means is the great secret of life the main cause, that is the secret of success of the top performing modern organisation, is the people and their management. No two people have the same expertise, so knowledge management in the changed scenario calls for professional prudence and restructuring of professional relationship. What is required for success of projects in the new environment is attention to super ordinate goals, setting and sharing of common goals, pooling and sharing of knowledge, specially implicit knowledge which is embedded in people, and application of knowledge for the realization of goals”.

1
Quality Control Circle (QCC)

“The main base for the QCC is the team of workers. The quality circle is “a work group of employees who meet regularly to discuss their quality problems, investigate causes recommend solutions and take corrective actions”.”

“The QC takes over the responsibility for solving quality problems, and they generate and evaluate their own feed back. But management typically retains control over the final decision regarding implementation of recommended solutions. It is not the presumption that employees inherently have this ability to analyse the quality problems. Therefore part of the quality circle concept includes teaching participating employees group communication skills, various quality strategies, and measurement and problem analysis techniques”.

Further Robins says, that “a view of the evidence indicates that they are much more likely to positively affect productivity. They tend to show little or no effect on employee satisfaction”.

Further, Robins quotes some authors and never fails to give the negative opinion about QC. “Although QC was the management fad of the 1980’s, they have become a failure. Utmost, these programmes operate for only one hour per week, with the remaining 39 hours unchanged – why should changes in 2.5 per cent of person’s job have a major impact?” He adds “the ease of implementing
QCs often worked against them. They were seen as a simple device that could be added on to the organization with a few changes required outside the programme itself. In many cases, the only significant involvement by management was funding the programme. So quality circles became an easy way for management to get on the employee involvement bandwagon. And, unfortunately, the lack of planning and commitment of top management often contributed to the failure of quality circles”.

Generally in the quality circle, every employee is encouraged to optimise his/her full potential by availing of opportunities that exist across multiple functions, disciplines as well as geographies. QC is an excellent platform to learn, grow, and excel in myriad field of expertise. The efficiency of the human capital therefore, is consistent and reinforces the organisations competitive edge.

**Problem Solving and QC Tools**

Quality Improvement model or the QI story, a Japanese origin, is a simple tool to solve problems. It can reduce a 20-page voluminous report to two pages using sketches, graphs and charts and with little annotated arrows.

A QI generally addresses the following sequence of questions.

1. What is the problem?
2. How do you know the problem?
3. How do you measure the problem?

4. What is your object or target for improvement?

5. What is the root cause of the problem?

6. What do you propose to do to solve it?

7. What specific solutions have you tried?

8. What results did you achieve?

9. If solved, how will you ensure that the problem will not recur?

10. What are the remaining problems?

11. What is going to be done about them?

A QI is an excellent way to recognise problem solving in a logical manner-laying out the problem and analysing and finding the solutions. It is a graphical language and can be a much better communicator than the written word. It is simple, exact, brief and comprehensive. It could accommodate virtually any type of statistical or analytical tools. It provides maximum flexibility. The process is varying with five-step, six-step and seven-step. But commonly a six-step story board that combines the first two steps, reason for improvement and current situation of the model is used by most of the companies.
TABLE 1.1

STEPS OF PROBLEM SOLVING WITH QI STORY

<table>
<thead>
<tr>
<th>I Step</th>
<th>II Step</th>
<th>III Step</th>
<th>IV Step</th>
<th>V Step</th>
<th>VI Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify Project</td>
<td>Isolate Components</td>
<td>Investigate Problem</td>
<td>Innovate Improvements</td>
<td>Indicate Results</td>
<td>Introspect the Project</td>
</tr>
<tr>
<td>i) Note background information</td>
<td>i) Strategy Process</td>
<td>i) Seek root causes</td>
<td>i) Select improvement methods</td>
<td>i) See effectiveness of methods</td>
<td>i) Note the learning point</td>
</tr>
<tr>
<td>ii) Note customers’ viewpoint</td>
<td>ii) Clarify the problem</td>
<td>ii) Investigate possible root-causes</td>
<td>ii) Analyse environment and plan implementation</td>
<td>ii) Establish relationship to process</td>
<td>ii) What to do differently</td>
</tr>
<tr>
<td>iii) Select, collect and display the indicator</td>
<td>iii) Design the goals</td>
<td>iii) Discover</td>
<td></td>
<td>iii) Assure improvement</td>
<td>iii) Take action</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>iv) Establish relationship of root causes</td>
<td></td>
<td>iv) Visualise next steps if needed</td>
</tr>
</tbody>
</table>


Types of Problems

Most problems can be classified into three types:

1. Zero problems.
2. Decrease problems and
3. Increase problems.

Zero Problems

Defects, complaints, missed appointments, incorrect answers, missed deliveries are all examples of zero problems that require elimination. To eliminate
zero problem, systematically address each and every cause of the problem. For each cause there may be several countermeasures. These may be applied according to the root cause of the problem. Stopping the process depends on customer requirements.

**Decrease Problems**

Solving decrease problem is to reduce its magnitude, rather than to eliminate it entirely. Decrease problems will most likely involve costs or other financial considerations and time. Reduction of production costs, reduction of design time, and reduction of delivery time are common examples of decrease (or reduction) problems. To solve decrease problem effectively, the problem must be converted to a zero problem. If the analysis is directed at reducing cost or time, the necessary and unnecessary components must first be identified. The data then can be arranged in the highest to lowest order and analysis to seek countermeasures can begin. Benchmarking, valueadded analysis, and other industrial engineering techniques can be used to help solve the areas identified for improvement.

**Increase Problems**

The objective of increase problem is to increase something, that is increasing sales, increasing production or yield and increasing closure rates
among the types of problems. These are most difficult to solve. Sometimes enormous amount of analysis is required. Data are often difficult to obtain. Experiments are often required to test solutions before they are applied. In many cases, components of increase problems are made of defects. When this type of root cause is identified, zero problem analysis techniques can be applied.

QC Tools

To address these problems, three sets of problem solving tools have emerged. The first set is called Seven QC Tools, the second, Seven Management Tools and the third is known as Advanced Tools.

Basic Stages in Problem Solving

The six stages of problem-solving are as follows.

Stage 1: The problem, together with the improvement objectives are identified.

Stage 2: The current performance against which the improvement can be assured is measured.

Stage 3: The most critical aspects of the problem are identified.

Stage 4: The root cause of the problem as determined.

Stage 5: Solutions to the root causes of the problem are proposed and recommendations are implemented.

Stage 6: Progress is monitored to ensure if solutions are effective and other problems are not created.
Table 1.2

Problem-Solving Tools

<table>
<thead>
<tr>
<th>Stage I</th>
<th>Stage II</th>
<th>Stage III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop a system orientation</td>
<td>Develop an improvement orientation</td>
<td>Develop a prevention orientation</td>
</tr>
<tr>
<td>7 QC Tools</td>
<td>7 Management Tools</td>
<td>Advanced Tools</td>
</tr>
<tr>
<td>Stratification</td>
<td>Affinity Diagram</td>
<td>Fault Tree analysis</td>
</tr>
<tr>
<td>Tally Sheet</td>
<td>Inter-Relationship diagram</td>
<td>Regression analysis</td>
</tr>
<tr>
<td>Histogram</td>
<td>Tree diagram</td>
<td>Design experiment (DOE)</td>
</tr>
<tr>
<td>Pareto analysis</td>
<td>Matrix Diagram</td>
<td>Failure Mode Effect Analysis (FMEA)</td>
</tr>
<tr>
<td>Cause &amp; Effect analysis</td>
<td>Matrix data</td>
<td></td>
</tr>
<tr>
<td>Scatter Diagram</td>
<td>Process decision chart</td>
<td></td>
</tr>
<tr>
<td>Control Chart</td>
<td>Arrow diagram</td>
<td></td>
</tr>
</tbody>
</table>

Employee Involvement (EI) and Employee Engagement (EE)

The Q.C. has its base in employees. “The companies may be big or small, old economy or new initiatives, everybody swears by the name of employee involvement (EI). In the lexicon of industries today, a new nomenclature, “Humanware’ has emerged in consonance with hardware (hard skill) and software (soft skills)”.

“The employee involvement is about teams whereas the employee engagement is about individual”. But employee engagement refers to a wide range of ways in which employees can become involved in voluntary initiatives. These initiatives involve a three-way partnership between the employer, employee
and volunteer organisation. Boeing’s definition of employee engagement is that an individual’s personal attachment to his or her work or both at intellectual and emotional levels.

In other words, it relates to what employees think and feel about their job, their leaders, and the work environment. The environment can include physical facilities, work-based benefits, pride in the company’s products and services and life/community-related programmes. Institute of Employment Studies (IES) defines engagement as the ‘positive attitude held by the employee towards the organisation and its values. An engaged employee is aware of business context, and works with colleagues to improve performance within the job for the benefit of the organisation’.

“When HR professionals use the term engagement they mean the following behaviour demonstrated by the engaged employee”.

- Belief in the organisation
- Desire to work to make things better.
- Understanding of business context and the bigger picture.
- Being respectful of, and helpful to colleagues.
- Willingness to go the extra mile.
- Keeping upto date with development in the field.
To sum up the above,

1. “Say” – An employee consistently speaks positively about the organisation to co-workers, refers potential employees and customers.

2. “Stay” – An employee has an intense desire to be a member of the organisation despite opportunities to work elsewhere.

3. “Strive” – An employee puts in extra effort and exhibits behaviours that contribute to business/organisation success.

IES 2003 Attitude Survey of over 10,000 employees in 14 organisations regarding engagement statements indicates:

- A positive attitude towards, and pride in the organisation.
- Belief in organisation products/services.
- A perception that the organisation enables the employee to perform well.
- A willingness to behave altruistically and be a good team player.
- An understanding of the bigger picture and willingness to go beyond the requirements of the job.

Emotional engagement is four times more valuable in driving employee effort. It’s one thing for employees to be satisfied with their jobs and another thing to be passionate about their work. Such workers are well-informed and are involved in decision-making. They are also more productive. Their ideas and
energy help companies achieve stronger financial and operating performance. Today, HR professionals have quantified a link between highly engaged employees and profitability.

**Employees Involvement**

Eventhough, the views of Debapriya, is heavily on the new concept of employees engagement most of the TQM experts emphasise more on employees involvement (EI).

Maran and Raja,\(^\text{10}\) while talking about the EI present the following critical factors found playing an important role in the QC.

1. Motivation
2. Empowerment
3. Training and Education
4. Team
5. Recognition and Reward
6. Performance Appraisal
8. House keeping.
The range of activities involved in EI approaches are:

a) Sharing of information

b) Providing report on work-related issues.

c) Making suggestions and

d) Self-directed responsibilities such as setting goals, business decisions, and problem solving.

**Advantages of EI**

It replaces the adversarial mentality with trust and co-operation. The skills and leadership capability of individuals and developed creating a sense of mission and fostering trust. Employees develop commitment to the organisation. Creativity and innovation, the source of competitive advantage are fostered. People are helped to understand quality principles and these principles are instilled into the corporate culture. Employees are allowed to solve problems at the source immediately. Quality and productivity are improved.

**The Drivers of Engagement**

The result of the Melcrum Research Report on employee engagement found that, 48 per cent discovered that senior leadership is important, 31 per cent identified direct supervisors and 29 per cent reported opportunities for career advancement. The following are the three drivers affecting the employees in
thinking and feeling about their company and building up emotional and intellectual engagement with their employer.

**Leadership**: Leaders should be good as communicators, with leadership competencies, employee development sharing business strategies, ethics, trust and respect.

**Work**: Work is described as job responsibilities/ design, empowerment, tools/technology, resources. Employee Involvement (teams and working together), training.

**Work Environment**: It involves diversity, safety, career development, pay and benefits, wellness, employee assistance programme, community involvement, pride and belonging.\(^{11}\)

**Quality**: “Quality is a strategic priority to-day and Indian industry appreciates that the level of expectation varies from one culture to another. The Japanese were known to be extremely demanding – and this helped raise the bar all round. Don’t always look to others for comparisons; ....... bench mark with yourself ......for startups”.\(^{12}\)

“Quality could mean different things to different people. There is an element of an enterprise from low defect rate to standards compliance to customer
satisfaction - so quality cannot be assured just by creating a quality assurance department. It is every body’s business”\(^\text{13}\).

**TOTAL QUALITY MANAGEMENT**

“British Quality Association defined TQM as management philosophy and company practices that aim to harness the human and material resources of an organisation in the most effective way to achieve the objectives of the organisation”.

“One of the principles which TQM companies all over the world are adopting is Management by Fact. This principle is difficult to institutionalise, because every employee in an organization has opinions, views and notions about how things should be done. They may talk about the root cause of the problem but may not give you the facts for solving the problem. People may become the part of the problem itself, rather than solutions. In Indian organization, senior middle management, supervisors and employees should be taught basic statistical techniques and the importance of facts in solving the problems. It helps to improve the decision-making and also solve major problems”\(^\text{14}\).

Every organisation should remember the fourteen points of Deming.\(^\text{15}\)

1. Create constancy of purpose for improvement of product and service.
2. Adopt the new philosophy.
3. Cease dependence on mass inspection.
4. End the practice of awarding business on price tag alone.
5. Constantly and forever improve the system or production and service.
6. Institute modern methods of training on the job.
7. Institute leadership.
8. Drive out fear
9. Break down barriers between staff areas.
10. Eliminate slogans, exhortations, and targets for the work force.
11. Eliminate numerical quotas.
12. Remove barriers to pride of workmanship.
13. Institute a vigorous programme of education and training.
14. Take action to accomplish the transformation.

**Total Quality Management (HR Way)**

The development of people and their involvement in improvement activities individually and through group activity is a key feature of TQM. There are a number of ways in which involvement through team working can be facilitated. Quality Circles (QC) and Quality Improvement Teams (QIT) are perhaps the most familiar examples but there are many other examples. Team building is a primary building block in the development of TQM. The Japanese are much more comfortable with the use of teams. But European companies pay
little attention to team activity. This may be due to the division nature of Western Industry “them and us”, “management and unions”.

**What are Quality Circles?**

QC is a direct form of employee participation in the business of any organisation. A typical QC is a voluntary group of six to eight employees from the same work area (smaller and larger circles do exist, but this is the average). They meet usually in company time, for one hour every week or fortnight, under the leadership of their work supervisor, to solve problems relating to improving their work activities and environment. QC appears to work because of three main factors.

1. Members like talking about their work.
2. Members are interested in their work and want to contribute and
3. Members welcome the opportunity to identify and solve, using their skills and experience, the problems they have to live with and nobody seems to care about.

**Operating Characteristics of QC (Based on Dale and Oakland).**

Dale and Oakland have clearly summarised the operating characteristics of Q.C.\(^{16}\)
The members join a circle voluntarily and can opt out as and when they wish.

Members select the problems and projects which they wish to tackle.

The solutions are evaluated in terms of their cost effectiveness.

The findings, solutions and recommendations of the QC are presented to senior management for comment and approval.

The QC implements where practicable, their recommendations. If this is not possible, the departments responsible for putting the recommendations into place should maintain a dialogue with the circle concerning the progress being made and the likely date of implementation.

Once implemented, the circle monitors the effects of the solution and considers future improvements.

The circle carries out a critical review of all activities related to the completed project. This enables the members to identify ways by which they might improve their problem solving activities.

**Philosophy of QC**

Quality Circle is a people-building philosophy, providing self-motivation and happiness in improving environment without any compulsion (or) monetary benefits. It represents a philosophy of managing people especially those at the
grass-root level as well as a clearly defined mechanism and methodology for translating this philosophy into practice and a required structure to make it a way of life. It is bound to succeed where people are respected and are involved in decisions, concerning their work life, and in environments where people’s capabilities are looked upon as assets to solve work area problems.

The quality circle philosophy calls for a progressive attitude on the part of the management and their willingness to make adjustments, if necessary, in their style and culture. If workers are prepared to contribute their ideas, the management must be willing to create a congenial environment to encourage them to do so.

**Concept of QC**

The concept of Quality Circle is primarily based upon recognition of the value of the workers as a human being, as some one who willingly activises on his job, his wisdom, intelligence, experience, attitude and feelings. It is based upon the human resource management considered as one of the key factors in the improvement of product quality and productivity.

Quality Circle concept has three major attributes.

- Quality Circle is a form of participation management.
- Quality Circle is a human resource development technique.
- Quality Circle is a problem solving technique.
**Objective of QC**

The objectives of Quality Circle are multi-faced. Continuous improvement in quality of work life through humanization of work changes the attitude of the workers. People get to learn additional skills which leads to self-development. It eliminates inter-departmental conflicts and a team spirit is developed. Positive working environment, total involvement of people at all levels, higher motivational level and participating in management process, improve organisational culture.

**Organisational Structure of QC**

A quality circle has an appropriate organisational structure for its effective and efficient performance. It varies from industry to industry, organisation to organisation. But it is useful to have a basic framework as a model. The structure of a Quality Circle consists of the following elements.

**A Steering Committee**

This is at the top of the structure. It is headed by a senior executive and includes representatives from the top management personnel and human resources development people. It establishes policy, plans and directs the programme and meets once in a month. The committee comprises:
Co-ordinator

He may be a Personnel or Administrative officer who co-ordinates and supervises the work of the facilitators and administers the programme.

Facilitator

He may be a Senior Supervisory Officer. He co-ordinates the works of several quality circles, through the circle leaders.

Circle Leader

Leaders maybe from lowest level workers or supervisors. A circle leader organises and conducts circle activities.

Circle Members

They may be staff workers. Without circle members the programme cannot exist. They are the life blood of quality circles. They should attend all meetings as far as possible, offer suggestions and ideas, participate actively in group process, and take training seriously with a receptive attitude. The roles of steering committee, co-ordinator, facilitator, circle leader and circle members are well defined.
Benefits and Limitations of Quality Circles

It took more than two decades for the quality control concept to get acceptance in India, after its introduction in Japan. This may be because Japan needed it for its survival in the competitive market. India had a reasonably protected, sellers’ market. Hence the lethargy towards efforts to improve quality and productivity. However, with the policy of liberalisation of economy and privatization of infrastructure developments, contexts have changed. The concept now needs to be looked upon as a necessity.

Quality Circle Tools

Following tools are used in the process of Q.C.\textsuperscript{17}

1. Flow Diagram : To enable understanding of the process/flow and locate a problem.


3. Data Collection : To understand the magnitude of the problem and understand the problem. It is the foundation for statistical analysis.

4. Graphs : Presentation of large amount of data in a cohesive manner.

5. Stratification : To segregate data accounting to contributing sources.
6. **Cause and Effect** : To map out all probable diagram.

7. **Pareto chart** : For identification/selection of major problem or area for improvement or control to differentiate between vital or trivial problems.

8. **Scaller Diagram** : For examining relationship between two variables.


10. **Control Charts** : For maintaining running control on a process- on line QC method.

### 1. **Ishikawa Diagram**

This is also known as Fishbone diagram or Cause and Effective diagram which is the brainchild of Kaoru Ishikawa, who pioneered quality management processes in the Kawasaki Shipyards, and in the process became one of the founding fathers of modern management. It is simply a diagram that shows the causes of a certain event. It was used in the 1960’s and is considered one of the seven basic tools of quality management, along with the Histogram, Pareto Chart, Check Sheet, Control Chart, Flow Chart and Scatter Diagram.

Causes shown in the diagram are often based on a certain category such as the 6 M’s, 8P’s or 4S’s described below. Cause and effect diagrams can reveal
key relationship among various variables and possible causes provide additional insight into process behaviour.

Causes in a typical diagram are normally arranged into categories, the main ones of which are:

The 6 M’s are Machine, Method, Materials, Measurements, Man and Mother Nature (Environment) (recommended for manufacturing industry).

The more modern selection categories used in manufacturing are Equipment, Process, People, Materials, Environment and Management.

The 8P’s are Price, Promotion, People, Processes, Place/ Plant, Policies, Procedures and Product (or services) (recommended for administration and service industry).

The 4S’s are Surroundings, Suppliers, Systems, Skills (recommended for service industry).

A common use of the Ishikawa diagram is in Product design, to identify desirable factors leading to an overall effect.
**Appearance**

Most Ishikawa diagrams have a box at the right hand side in which is written the effect that is to be examined. The main body of the diagram is a horizontal line from which stems the general causes, represented as “bones”.

These are drawn towards the left hand side of the paper and are each labelled with the causes to be investigated, often brainstormed beforehand and based on the major causes listed above. Off each of the large bones there may be smaller bones highlighting more specific aspects of a certain cause, and sometimes there may be a third level of bones or more. When the most probable causes are identified, they are written in the box along with the original effect. The more populated bones generally outline the more influential factors, with the opposite applying to bones with fewer “branches”. Further analysis of the diagram can be achieved with a Pareto Chart.

A fundamental principle of the scientific method and PDSA, is interaction – once a hypothesis is confirmed (or negated), executing the cycle again will extend the knowledge further. Repeating the PDSA cycle can bring us closer to the goal visually a perfect operation and output.
In Six Sigma Programmes, the PDSA cycle is called “Define, Measure, Analyse, Improve, Control” (DMAIC). The iterative nature of the cycle must be explicitly added to the DMAIC procedure.

PDSA should be repeatedly implemented in spirals of increasing knowledge of the system that converge on the ultimate goal, each cycle closer than the previous. One can envision an open coil spring, with each loop being one cycle of the scientific method – PDSA, and each complete cycle believes that our knowledge and skills are limited, but improving, especially at the start of a project. Key information may not be known. The PDSA – Scientific method – provides feedback to justify our guesses (hypotheses) and increase our knowledge. Rather than enter “analysis paralysis” to get it perfect the first time, it is better to be approximately right than is exactly wrong. With the improved knowledge, we may choose to refine or alter the goal. Certainly, the PDSA approach can bring us closer to whatever goal we choose. However, the scientific method and PDSA apply to all sorts of projects and improvement activities. The power of Deming’s Concept is in its apparent simplicity.

2) Pareto Chart

A Pareto chart is a specified type of bar chart where the values being plotted are arranged in descending order. It is named after Vilfredo Pareto, and its use in quality assurance was popularized by Joseph M. Juran and Kaoru Ishikawa.
The Pareto chart is one of the seven basic tools of quality control, which include the histogram, Pareto chart, Check Sheet, Control Chart, Cause and Effect diagram, Flow chart and Scatter diagram.

Typically on the left vertical axis is frequency of occurrence, but it can alternatively represent cost or other important unit of measure. The right vertical axis is the cumulative percentage of the total number of occurrences, total cost, or total of the particular unit of measure. The purpose is to highlight the most important among a typically large set of factors. In quality control, the Pareto Chart often represents the most common sources of defects, the highest occurring type of defect, or the most frequent reasons for customer complaints, etc.

**Continuous Process Improvement (CPI)**

Out of the critical factors related above, the researcher considers the CPI as a factor to be implemented in every stage. So she wanted to give a brief note on this.

There are seven methods to ensure continuous process improvement.

1. Identifying and defining the problem.
2. Studying the existing situation, collecting necessary data.
4. Evaluating alternatives and choosing the preferred one.
5. Implementing the improvement and measure results.

6. Evaluating and revising, if required.

7. Otherwise, returning to step one and starting all over again with a new problem.

**Process Improvement Methods (PIM)**

Earlier factors such as better lighting, ventilation, new safety devices, educating workers to improve their skills and knowledge, instituting suggestion schemes and awards for good suggestion for improvement, incentives to workers and increased productivity were considered to be some of the factors contributing to continuous improvement. Work simplification was developed as a Productivity Improvement Programme. This technique is based on the philosophy “workers know their jobs better than any one else”. Another approach to process improvement is “plan method change”. This method eliminates unnecessary operations. Traditional improvement programmes are focused almost exclusively on productivity and cost, whereas the following recent improvement programmes focus on quality improvement:

1. The Juran Trilogy (developed by Joseph Juran) consists of planning, control and improvement

2. The PDSA cycle (Plan-Do-Study-Act) developed by Shewhart and modified by Deming comprises at planning stage, plan activities,
project background and reason on selection, set a target and prepare a schedule of activities.

3. Grasp the current status

4. Analysing the cause and determining the corrective action consist of preparing the cause- and- effective diagram, preparing a hypothesis and verifying the most likely causes and determining the corrective action.

5. Do stage.

6. Check stage: (to check the effect of corrective action).
   
a) Compare the overall results.
   
b) Find the cause of failure to meet results.
   
c) Find if results have been achieved and the goal has been met.

7. Act stage: (To take appropriate action).
   
a) Document, standardise and control.
   
b) Impart training.

This PDCA cycle can be used in the following areas:

1. Reduction of existing defects.

2. Improvement of the system such as quality assurance system or manufacturing process.

3. Acquisition of new knowledge such as optimal conditions in R &D or Design improvement.
4. Introduction or construction designing of a new system or drastic improvement in an existing system.

Also it can be used in managing an ongoing system such as Hoshin Planning Cycle.

**Kaizen Umbrella**

Kaizen, a Japanese word, means improvement and an ongoing improvement which involves, everyone in the organisation. Kaizen is the essence of the most unique Japanese improvement such as TQC activities, QC activities, and labour relation all reduced to one word KAIZEN. The term Kaizen also can be used in place of the words productivity, TQC, Zero Defect (ZD), Quality Circles, Kanban and Suggestion System.

**Kaizen Umbrella**

It consists of the following:

- **Customer Orientation**: Kaiban
- **TQC**: Quality Improvement
- **Robotics**: Just in time (JIT)
- **Q.Cs**: Zero Defect (ZD)
- **Suggestion system**: Small group activities (SGAs)
- **Automation**: Co-operative Labour Management Relations.
Discipline in the work force: New product development.

TPM: Productivity Improvement.

Three Segments of Kaizen

Kaizen programme can be divided into three segments depending upon the complexity and the level of Kaizen.

i) Management–oriented kaizen

ii) Group–oriented kaizen

iii) Individual-oriented kaizen.¹⁸

Contributors of TQM

Looking for the best quality is always with an individual’s purview. But it was not properly identified and systematized. The contribution of following experts in the field brought the TQM into the world stage.

1. Dr. W.A. Shewhart is the man who discovered quality. To simply by the inspection process he evolved a procedure in 1924. Published “Economic Control of Quality of Manufactured Product” in 1931.

2. Dr. W. Edwards Deming worked with Dr. Shewhart. He developed sampling techniques for census operations in US in 1940. He is the author of eight technical books.
3. Dr. J.M. Juran developed the model “Juran Trilogy” for understanding how to truly manage quality. He has authored fifteen books, forty video cassettes and published more than 200 papers.

4. Dr. K. Ishikawa responsible for Japanese quality revolution. He is widely known as Father of Quality Control Circles. He has authored three books.

5. Prasanta Chandra Mahalanobis brought statistical quality control to India.

6. Genichi Taguchi developed method for on line and offline quality control. His approach is Total Quality Assurance. His methods are called Taguchi methods.

7. Armand V. Feigenbaum identified three stages in QC, namely 1) New Design Control, 2) Incoming Material Control and 3) Product (or) Shop Floor Control.

**Quality Circle Forum of India (QCFI)**

Quality Circle Forum of India (QCFI) was established in 1982, as a non-profit body with Hyderabad as its Head Quarters.

QCFI is the National organisation for promotion, propagation and advancement of theory and practice of Quality Circles as a part of Total Quality Management.
Objectives of QCFI

- To act as a central clearing house for Quality Circle and other quality concepts related information.

- To serve as a common forum and platform for all those interested and engaged in operation of Quality Circle and other quality concepts as a part of TQM and provide opportunities to discuss related matters with a view to sharing knowledge and experience by way of seminars, workshops, conferences, and conventions, publications, audio visuals etc.

- To provide assistance to interested organisations and individuals to launch and operate Quality Circles integrated with TQM as also introduce other related quality concepts.

- To undertake/sponsor research programme designed to further these concepts.

- To improve, enrich and uplift the quality of work life and to provide opportunities for self-development of Quality Circle members.

- To facilitate, recognise and encourage those who have contributed significantly to the achievement of the objectives of the Forum.
➢ To engage in activities calculated to benefit and promote the welfare and well being directly or indirectly of the members of the Forum.

➢ To form chapters of the Forum at different places and lay down policy guidelines and procedures for their management, administration and proper working.

➢ To cultivate and promote a high standard of moral ethics among its members.

➢ To associate with other National and International organisations engaged in a similar pursuit in furthering the interest of Quality Circle other quality concepts.

➢ To be and always continue to be a non-profit non-political, non-partisan and non-sectarian Forum.

QCFI – Organisation

The structure of Quality Circle Forum of India (QCFI) has

a. Patron members.

b. Institutional Members

c. Quality Circle Members and

d. Individual Members.
An Executive Board with elected Directors from among the members manages the affairs of QCFI. The President elected by the Executive Board is the head and Board also elects two Vice-Presidents and one Honorary Treasurer. Regular administration is with the Executive Director and he carries out the activities as per the Forum’s policy and decisions taken by the Board from time to time.

QCFI has chapters all over India in 19 places to propagate Quality Circle or other quality concepts integrated with TQM. Each chapter has a Governing Council that functions in line with QCFI’s policies and procedures. Chairman, Secretary and Treasurer elected from amongst its members are responsible for all ongoing activities.

Chapters draw in members from the industries, institutions, circles and individuals keen to contribute, to carry on the activities. QCFI HQs and Chapters play an important role for human resources development in manufacturing industries, service organisations and public utility services, including government, thus augmenting the human potential for achieving higher quality, productivity and capacity utilisation.
Services Offered by Quality Circle Forum of India

Need for Quality Management System

Now the market place is highly competitive and it is becoming tougher and tougher every minute. In the words of Bill Gates ‘the successful companies of next decade will be the one that uses digital tools to reinvent the way they work. The companies will make decisions quickly, act efficiently and touch their customer in a positive way”.

This will be possible only when an organisation thinks and functions in a cohesive way as one group and quickly adapts ideas to the changes that are constantly and continuously taking place. Such a thing can be achieved only by adopting Total Quality Management System.

Services Offered by QCFI

QCFI is privileged to have persons who have held or holding senior executive positions with vast experience on implementing various Quality concepts as members from all over India.

Hence, even though QFCI’s main focus is to propagate Quality Circle movement in India, it undertakes total responsibility to institutionalise.
i. Quality Circle integrated with Total Quality Management.

ii. Quality Improvement Teams/Six Sigma goals attainment.

iii. Learning Problem Solving Techniques/ New Seven Tools.

iv. Five ‘S’ and Kaizen.

v. Total Productive Maintenance (TPM).


vii. All other quality concepts.

QCFI is recognised as an institution serving the cause of Quality with special focus on Quality Circle movement in India. QCFI represents the country in the International Coordination Committee of 13 nations set up for organising International Conventions on Quality Control Circles annually in rotation.

QCFI has organised and conducted in India two International Conventions on Quality Control Circles (ICQCC) in the year 1989 and 2002 and conducts Chapter Conventions and National Convention every year in which Quality Circle members present Case Studies and quality concept practitioners Technical Papers. QCFI regularly brings out educational and training materials in English, Hindi and regional languages (Books, Booklets, CD-Roms and Posters). QCFI disseminates knowledge and information through its quarterly journal ‘Quality Circle India’. QCFI brings out a monthly ‘QC E- Magazine’ for its members effective from May 2000. Members only need to register their E-mail ID with QCFI-HQs.
QCFI conducts in-house training and orientation programmes in organisations to suit their needs. Programmes are also conducted at Headquarters as well as at Chapters on a regular basis.

QCFI has conducted a number of in-house programmes on Quality Circles integrated with TQM and related concepts such as Quality Improvement Teams, Five S. Kaizen TPM, ISO 9000, ISO 14000 etc.

Some of the skills development programmes done as part of the above, right from the circle members to different levels are:

- Small Group Activities.
- Problem-Solving Skills
- Application of QC Statistical Tools
- Decision-making skills
- Interactive skills
- Group process and team-working skills
- Presentation and communication skills
- New 7 tools application skills
- Meetings/Process and effective meetings
- Planning and implementation skills
- Goals/Objectives alignment process (Policy Management/ Development)
- Benchmarking process
- Skills of observation, perception and systems analysis.

**Need for the Study**

India is a very late starter in the Quality Control Movement. Protectionist policies and absence of competition relegated quality to the back stage. It is only since the advent of Japanese technology into India that QC has attracted attention. The opening of Indian economy to market forces and global competition since 1991, has now brought quality to the front stage. Even now, the need for and importance of comprehensive and continuous education in quality control methods at all job levels, from top management to shop floor workers are not sufficiently recognised and appreciated. They aim at preventing quality defects rather than detecting them. Still most of the companies follow Taylor model of treating shop floor workers as mere cogs in the production machine.

The researcher as a faculty member became interested in the quality concepts and tried to know indepth practice. The area of the study being the company having collaboration with a Japanese company, the researcher thought that the company, should practise the QC process. After knowing the Hi Tech Arai Ltd., Madurai is actually practising the QC, the researcher wanted to study the QC in the light of Human Resource application and its impact on the productivity in the above organization. Since it will be a very arduous study to
take up the whole TQM concept in the company, the researcher took only the HR aspect in the TQM that is QC. If the study makes a good prospective result in terms of productivity, this may in future to lead the other companies improving quality production with quality work and workers.

**Statement of the Problem**

The statement of the problem either in question or as a decorative statement attempts to focus on a goal and thereby gives direction to the research problem. It must be limited in scope to arrive at a definite conclusion. A problem suggests a specific answer or conclusion. A cause-effect relationship may be suggested upon the basis of personal observation, experience and review of selected studies. The problem of study undertaken may be stated as under.

- Does the QC enhance or improve the relationship between employer and the employee?.
- Does the QC make the organisation exert lesser efforts in solving the problems?
- Is it true that the attitude of the employees is based on the QC activities?
- Does the employee or the QC member expect participation in decision-making?
• Does the employee or the QC member expect recognition by the management of the good work done by him?.

• Do the motivational factors really contribute to the productivity?

• Do the work environment and organisation climate have an impact on workers’ quality performance.

• Is the improvement in the work efficiency due to QC activity?.

• Are the belongingness and organisational citizenship of employee the result of QC activities?.

• Is the participating management very well practised through Q.C.?

**Objectives of the Study**

The study has the objectives as stated below:

1. To study the working of QC in Hi Tech Aray Ltd.,

2. To study the respondents’ profile in detail.

3. To evaluate the working of some motivational factors in productivity due to Q.C..

4. To analyse whether the Q.Cs. improve the efficiency and various skills of workers.

5. To study how far Q.C. serves the purpose of the employees.

6. To study how far Q.C. enhances the attitude of job satisfaction.
7. To study the Q.C’s role in shaping the employees more involved with organisation.

8. To study the employees contribution to Q.C.

9. To study how far the employees are involved in Q.C. activities.

10. To suggest uniform procedure, so as to eliminate disparities, and favouritism among and towards employees.

11. To study whether there is increase in productivity due to establishment of Q.Cs.

12. To investigate financial progress in the organisation due to Q.Cs activities.

13. To make useful suggestions on the basis of findings.

**Hypothesis of the Study**

Following null hypothesis was framed to find out whether the Q.C. has actually improved the various skills of the employees.

Hi: There is no significance difference in improvement of skills among workers after joining Q.C.

**Assumption of the Study**

This study is based on the following assumptions:

1. QC plays important role in narrowing down the distance between employer and employee.
2. QC improves the relationship between employer and employee.
3. The empowerment of employee is one of the important factors in QC.
4. QC keeps the employee better informed on the organisation’s procedure, goals and strategies.
5. QC is the easy means to get the organisation’s strategic decisions carried out.
6. QC improves the work quality.
7. Problems are solved easily through QC.
8. Productivity is increased.
9. Only the Human Resource factors are considered and not the whole TQM.
10. Productivity was considered as the benchmark for the performance and efficiency of the workers.
12. The motivational factors are considered to be important and the performance and efficiency are the output.
13. Since the study is in the light of human resource employment, other concepts in TQM, namely, Sig Sixma Lean Thinking Knowledge Management, are not considered.
Limitations of the Study

The study focuses on all permanent and casual laboures and temporary employees in Hi Tech Aray Ltd., Madurai.

In order to measure the volume of production of various kinds of products, ten year period from 1977-78 to 2006-2007 has been chosen.

This study is mainly concerned with the impact of Quality Circle in employee motivation, at Hi Teach Aray Limited Madurai.

Eventhough the QC is one of the important components in Total Quality Management process, the quality aspects of product, marketing and others are not considered for this study, because the study mainly relates to Human Relations aspects only. Also, among HR, the main aspect is only on Motivational Factors. Hence some of the statistical tools like DMAIC, Transformational Analysis and related tools were not considered for analysis.

The impact of the Quality Circles in motivational factors were measured in terms of the volume of productivity and its Compound Growth Rate. Also to support the idea, the Income and Expenditure of ten years were also analysed to find out the Profit or Loss of the company.
Significance of the Study

This study is done to assess the Quality Circle activities mainly in relation to motivation. This study may throw light on whether the QC activities motivate the employees towards higher productivity and solve the problems. And also to find out if the persistent efforts and activities result in any improvement in employee skills, attitude and whether the work minimisation and maximum utilisation of skills and energy are actually welcomed by employees.

The findings of the study may help in planning the future course of action in areas of H.R. This study may help the other similar organisations in improving various skills of the worker and make him part and parcel of the organisation and to establish Q.Cs. in the organisation

Chapterisation

This study consists of six chapters. The first one is introductory in nature. The second chapter reviews related studies. The third chapter presents a profile of the Hi Tech Aray limited, Madurai. The fourth chapter explains the methodology adopted. The fifth chapter analyses and interprets the data. The sixth one and the final chapter present the findings, conclusion and suggestions respectively based on the study.
REFERENCES


3. Ibid.

4. Ibid.

5. Ibid.


7. Ibid., p.91.

8. Ibid., p.88.

9. Ibid., p.89.


13. N. Chandrasekaran.


