THE QUALITY GURUS: WHAT CAN THEY DO FOR YOUR BUSINESS?

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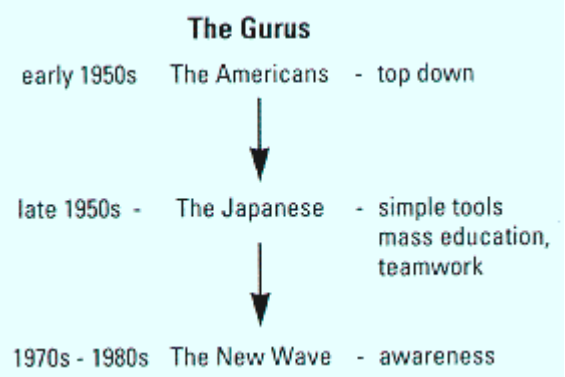
What is a Quality Guru?

If quality is important, so are the people that propound it. It is human nature to deify great men and women who have contributed to the evolution of human thought and progress. In the conception and conduct of manufacturing there is great opportunity to contribute to industry's and society's common good. Improvements in productivity and reductions in cost in manufacturing can have such an impact that they overshadow technical advances. Quality also is motivational and increasingly concerns us all. This is partly a result of the impact of the Gurus, but also facilitates their very creation.

A guru, according to Roget, is a good man, a wise man and a teacher. A Quality Guru certainly should be all of these, and moreover a charismatic individual whose concept and approach to quality within business and, possibly life generally, has made a major and lasting impact.



The Gurus in this document include the ones that have made and are continuing to make the most major impact. Many possible candidates have been excluded for lack of space and for the clarity of the overall message of this document. Those that are included cover the historical period from World War II. Their emergence largely represents responses to changes in the American and Japanese markets and the need to adapt to survive. Their messages are relevant to UK industry, but need to be put into context. They cover both the development of philosophy and tools. These tools include technical tools to control industrial design and manufacturing such as contributions of Shingo, Ishikawa and Taguchi. They also include management tools to achieve quality, such as the Zero Defect approach of Philip Crosby, and the concepts of company wide and total quality associated with Ishikawa and Feigenbaum.

Three clear groups of Quality Gurus can be identified covering the period since World War II. These are:

1. The early Americans who took the messages of quality to the Japanese.
2. The Japanese who developed new concepts in response to the Americans' messages.

3. The new Western wave of Gurus who, following Japanese industrial success, have given rise to increased quality awareness in the West.

The early Americans

The Americans were themselves effectively responsible for making possible the miraculous turn-around of Japanese industry and for putting Japan on the road to Quality Leadership.

Much of this transformation was associated with the introduction of statistical quality control into Japan by the US Army over the period 1946 to 1950 and the visits by three key American Quality Gurus in the early 1950s. These were:

- W Edwards Deming Joseph M Juran Armand V Feigenbaum .

The Japanese

The Japanese adopted, developed and adapted the methodologies that the Americans brought in and by the late 1950s had begun to develop clearly distinctive approaches suitable for their own culture. The Japanese Gurus emphasised mass education, the use of simple tools and teamwork and had a background in an educational role. The three Japanese Quality Gurus included in this document are:

- Dr Kaoru Ishikawa Dr Genichi Taguchi Shigeo Shingo .

The new Western wave

Much of the increased awareness of the importance of quality in the West in recent years has been associated with a new wave of Gurus who have well publicised some of the quality issues, through the 1970s and 1980s. The three included in this document are:

- Philip Crosby Tom Peters Claus Moller .

THE EARLY AMERICANS

W Edwards Deming

Dr Deming is the one Quality Guru most people connected with industry have heard of. Born in 1900, Dr Deming died in 1993.

Rise to fame

W Edwards Deming was awarded his doctorate in mathematical physics in 1928. He then worked in the US Government Service for many years, particularly in statistical sampling techniques. He became particularly interested in the work of statistician Walter Shewhart, and believed that his principles could be equally applied to non-manufacturing process. He applied Shewhart's concepts to his work at the National Bureau of the Census. Routine clerical operations were brought into statistical process control in preparation for the 1940 population Census. This led to six-fold productivity improvements in some processes. As a result, Deming started to run statistical courses to explain his and Shewart's methods to engineers, designers, etc., in the US and Canada. In 1943 he published a technical book, Statistical Adjustment of data.

Beneficial effects of Deming's programmes were seen such as reductions in scrap and rework. However, these advances did not have a lasting effect after the war. In the boom market anything that was produced was sold - with or without statistical or quality control. A second factor had a strong bearing on Deming's later success. To quote him: 'The courses were well-received by engineers, but management paid no attention to them. Management did not understand that they had to get behind improvement of quality and carry out their obligations from the top down. Any instabilities can help to point out specific times or locations of local problems. Once these local problems are removed, there is a process that will continue until someone changes it. Changing the process is management's responsibility. And we failed to teach them that.'(1)

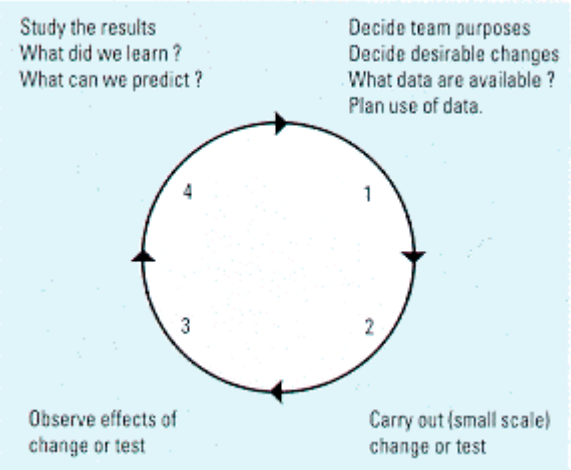
After the war Deming was sent to Japan as an adviser to the Japanese Census. He became involved with the Union of Japanese Scientists and Engineers (JUSE) after its formation in 1946. At about the same time a delegation from Bell Telephone Laboratories in America visited Japan and demonstrated Deming's quality control techniques. As a result, Deming's name became known and JUSE invited him to lecture to the Japanese on statistical methods. In the early '50s he lectured to engineers and senior managers, including in his lectures principles now regarded as part of TQM, or Company-wide Quality. In 1956 Deming was awarded the Shewhart medal by the American Society for Quality Control. Four years later, Deming's teachings were widely known in Japan and the Emperor awarded him the Second Order of the Sacred Treasure.

It was not until the 1970s, however, that Deming started to make an impact in the West. This appeared to happen when in 1979 Bill Conway, President of Nashua Corporation met with Deming. An NBC television documentary broadened his audience in 1980. It was entitled, If Japan Can, Why Can't We?. Throughout the 1980s various books were written by others to document and explain his work. His own book Out of the Crisis was published in 1986 and he was awarded the National Medal of Technology in America the following year. Also in 1987, the British Deming Association was formed to spread awareness of the Deming philosophy.

(1) *The Keys to Excellence - Nancy R Mann*

Deming's message to the Japanese

Deming's message to the Japanese reflected his statistical background. However, he broadened Shewhart's manufacturing approach to include non-manufacturing and human variation. He encouraged managers to focus on variability and understand the difference between special causes and common causes. He said that the special causes of variation in a product, process or service were those which prevented its performance from remaining constant in a statistical sense. These special causes are often easily assignable: changes of operator, shift, or procedure, for example. They can often be identified, and sometimes solved by local operators. On the other hand, common causes are those which remain once the special causes have been eliminated. They are due to the design, or the operation of the process or system. They may be identified by the operators, but only management authority can eliminate common causes.



Deming believed that managers who lacked this understanding of variation, and confused the two types of variation could actually make matters worse. Furthermore he revised his views on responsibility for variation, until by the mid 1980s he estimated that management was accountable for up to 94% of the potential improvement.

However, Deming's lectures and work extended considerably beyond statistical methods. He encouraged the Japanese to adopt a systematic approach to problem solving, which later became known as the Deming or PDCA (Plan, Do, Check, Action) cycle. He also pushed senior managers to become actively involved in their company's quality improvement programmes.

Deming's work in the West

Deming's work in Japan has been identified as putting Japan on the road to leadership in international business and industry. Subsequent work by Deming and his followers in the United States and elsewhere has attempted to make major changes in the style of Western management. This is however more management-based than statistically-based. Much of this is captured in his book Out of the Crisis. Deming constantly improved and refined his ideas, also taking on-board ideas from others and he is probably seen as the father figure of the modern quality revolution; perhaps the number one Guru.

Dr Deming himself emphasised that no one sentence or chapter of his books captured the full intent of any of his 14 fundamental points. However, he placed great importance and responsibility on management, both at the individual, company and societorial level. In particular, in talking about the need to transform American management in the 1980s he stated:

'Failure of management to plan for the future and to foresee problems have brought about waste of manpower, of materials, and of machine-time, all of which raise the manufacturer's cost and price that the purchaser must pay. The consumer is not always willing to subsidise this waste. The inevitable result is loss of market.'(2)

So what is management's way forward?:

'Everyone doing his best is not the answer. It is first necessary that people know what to do. Drastic changes are required. The first step in the transformation is to learn how to change... Long term commitment to new learning and new philosophy is required of any management that seeks transformation. The timid and the faint-hearted, and people that expect quick results are doomed to disappointment.'(2)

Whilst the introduction of statistical problem solving and quality techniques and computerisation and robotization have a part to play, this is not the solution: 'Solving problems, big problems and little problems, will not halt the decline of American industry, nor will expansion in use of computers, gadgets, and robotic machinery. Benefits from massive expansion of new machinery also constitute a vain hope. Massive immediate expansion in the teaching of statistical methods to production workers is not the answer either, nor wholesale flashes of quality control circles. All these activities make their contribution, but they only prolong the life of the patient, they can not halt the decline'.(2)

Only transformation of management and of Government's relations with industry can halt the decline.

Even in Japan in the 1950s, Deming taught that 'the consumer is the most important part of the production line'. One useful portrayal of the Deming philosophy, the Joiner Triangle, shows this concern with the customer.

The word 'obsession' conveys the profound and primary importance of quality. Deming was concerned with delighting, rather than merely satisfying customers. The Joiner Triangle shows that such quality is achieved by total teamwork and the 'scientific approach'. Certain features of his later teachings in America were based on such foundations.

In his seminars in America in 1980, he spoke of the need for 'the total transformation of Western Style of Management'. He produced his 14 Points for Management, in order to help people understand and implement the necessary transformation. Deming said that adoption of, and action on, the 14 points are a signal that management intend to stay in business. They apply to small or large organizations, and to service industries as well as to manufacturing. However the 14 points should not be seen as the whole of his philosophy, or as a recipe for improvement. They need careful discussion in the context of one's own organization.

[2] *W Edwards Deming, Out of the Crisis 1986*

Deming's 14 Points

1. Create constancy of purpose to improve product and service.
2. Adopt new philosophy for new economic age by management learning responsibilities and taking leadership for change.
3. Cease dependence on inspection to achieve quality; eliminate the need for mass inspection by building quality into the product.
4. End awarding business on price; instead minimise total cost and move towards single suppliers for items.
5. Improve constantly and forever the system of production and service to improve quality and productivity and to decrease costs.
6. Institute training on the job.
7. Institute leadership; supervision should be to help do a better job; overhaul supervision of management and production workers.
8. Drive out fear so that all may work effectively for the organization.
9. Break down barriers between departments; research, design, sales and production must work together to foresee problems in production and use.
10. Eliminate slogans, exhortations and numerical targets for the workforce, such as 'zero defects' or new productivity levels. Such exhortations are diversory as the bulk of the problems belong to the system and are beyond the power of the workforce.
11. Eliminate quotas or work standards, and management by objectives or numerical goals; substitute leadership.
12. Remove barriers that rob people of their right to pride of workmanship; hourly workers, management and engineering; eliminate annual or merit ratings and management by objective.
13. Institute a vigorous education and self-improvement programme.
14. Put everyone in the company to work to accomplish the transformation.

The 14 Points would take more space than this whole document for a full discussion and interpretation. Despite their inherent sense, some are controversial. Some, like Point 10 'Eliminate Slogans', certainly contradict the views of other Quality Gurus discussed in this document. In general, the 14 Points are often regarded as very important but not as in themselves providing tools. There is a tendency to look to other Gurus for tools. Deming himself provides a seven point action plan for change, starting from management struggling over each of the 14 Points and the Deadly Diseases and obstacles that Deming sees as afflicting most companies in the Western World. Some of Dr Deming's Deadly Diseases are peculiar to American industrial companies. Those that are not include:

- A lack of constancy of purpose
- Emphasis on short-term profits etc
- Evaluation of performance, merit-rating, or annual review

- Mobility of management
- Management by use only of visible figures, with little or no consideration of unknown or unknowable figures.

He identifies the obstacles that he sees in addition to these diseases as a range of attitudes which can get in the way of the necessary transformation eg 'Hope for instant pudding' or 'Our quality control department takes care of all our problems of quality'.

Action plan

The steps in his seven point action plan are thus:

1. Management struggles over the 14 Points, Deadly Diseases and obstacles and agrees meaning and plans direction.
2. Management takes pride and develops courage for the new direction.
3. Management explains to the people in the company why change is necessary.
4. Divide every company activity into stages, identifying the customer of each stage as the next stage. Continual improvement of methods should take place at each stage, and stages should work together towards quality.
5. Start as soon and as quickly as possible to construct an organization to guide continual quality improvement. Deming advocates the Deming or Shewhart Cycle as a helpful procedure for improvement of any stage.
6. Everyone can take part in a team to improve the input and output of any stage.
7. Embark on construction of organization for quality. (Deming sees this as requiring the participation of knowledgeable statisticians.)

Latter-day Deming

In the late 1980s and early 1990s Deming's thinking can perhaps best be expressed as Management by Positive Co-operation. He talks about the New Climate which consists of three elements. These are Joy in Work, Innovation and Co-operation. He has referred to this New Climate as 'Win: Win', as opposed to the 'I Win: You Lose' attitude engendered by the ethic of Competition.

Before his death Deming appears to have attempted a summary of his 60 years' experience. This he called the System of Profound Knowledge. It describes four interrelated parts:

1. Appreciation for a system

This emphasises the need for managers to understand the relationships between functions and activities. Everyone should understand that the long term aim is for everybody to gain - employees, share holders, customers, suppliers, and the environment. Failure to accomplish the aim causes loss to everybody in the system.

2. Knowledge of statistical theory

This includes knowledge about variation, process capability, control charts, interactions and loss function. All these need to be understood to accomplish effective leadership, teamwork etc.

3. Theory of knowledge

All plans require prediction based on past experience. An example of success cannot be successfully copied unless the theory is understood.

4. Knowledge of psychology

It is necessary to understand human interactions. Differences between people must be used for optimisation by leaders. People have intrinsic motivation to succeed in many areas. Extrinsic motivators in employment may smother intrinsic motivation. These include pay rises and performance grading, although these are sometimes viewed as a way out for managers.

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Joseph M Juran

Rise to fame

Like Deming, Dr Joseph Juran is a charismatic figure of senior age, being born in December 1904. A Balkan-born American, Joseph Juran started out professionally as an engineer in 1924. In 1951 his first Quality Control Handbook was published and led him to international eminence. Chapter 1 of the book was titled The Economics of Quality and contained his now famous analogy to the costs of quality: 'there is gold in the mine'.

Again like Deming, Juran was invited to Japan in the early 1950s by the Union of Japanese Scientists and Engineers (JUSE). He arrived in 1954 and conducted seminars for top and middle-level executives. His lectures had a strong managerial flavour and focused on planning, organisational issues, management's responsibility for quality, and the need to set goals and targets for improvement. He emphasised that quality control should be conducted as an integral part of management control.

His lectures were followed up at more junior management by JUSE and the Japanese Standards Association. Large companies started internal training, courses for foremen were offered on national radio, and booklets were even made available at newspaper kiosks.

Juran has had a varied career in management and his interest has been wider than just quality, having been concerned with the underlying principles common to all managerial activity. His 12 books have collectively been translated into some 13 languages. He has received more than 30 medals, honorary fellowships, etc in 12 countries. Like Deming, these include the highest decoration presented to a non-Japanese citizen, the Second Order of the Sacred Treasure.

Juran's message

There are many aspects to Juran's message on quality. Intrinsic is the belief that quality does not happen by accident, it must be planned.

His recent book Juran on Planning for Quality is perhaps the definitive guide to Juran's current thoughts and his structured approach to company-wide quality planning. His earlier Quality Control Handbook was much more technical in nature.

Juran sees quality planning as part of the quality trilogy of quality planning, quality control and quality improvement. The key elements in implementing company-wide strategic quality planning are in turn seen as identifying customers and their needs; establishing optimal quality goals; creating measurements of quality; planning processes capable of meeting quality goals under operating conditions; and producing continuing results in improved market share, premium prices, and a reduction of error rates in the office and factory.

Juran's 'Quality Planning Road Map' consists of the following steps:

1. Identify who are the customers.
2. Determine the needs of those customers.

3. Translate those needs into our language.
4. Develop a product that can respond to those needs.
5. Optimise the product features so as to meet our needs as well as customer needs.
6. Develop a process which is able to produce the product.
7. Optimise the process.
8. Prove that the process can produce the product under operating conditions.
9. Transfer the process to Operations.

Illustration of Quality Trilogy via a Control Chart:

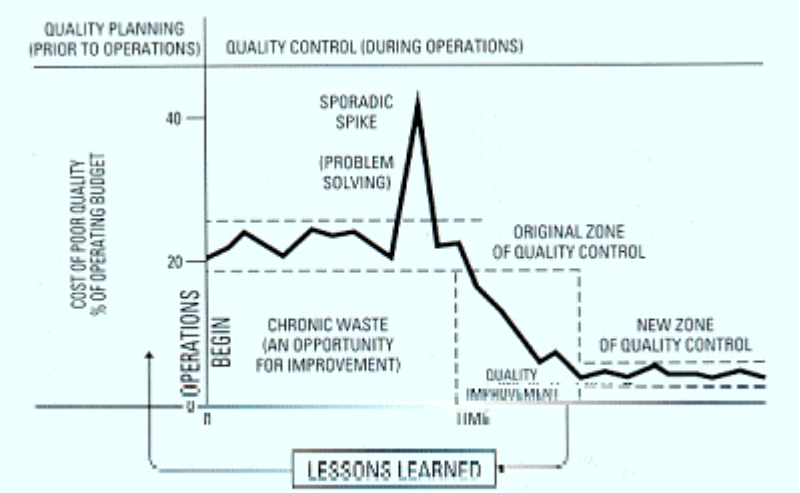
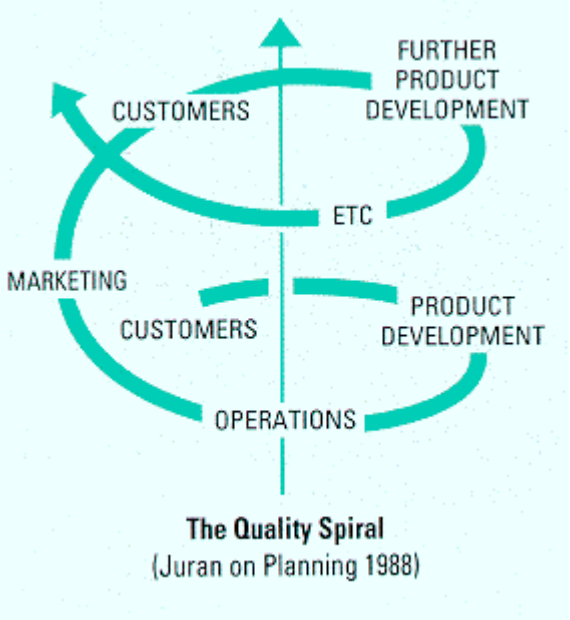


Illustration of Quality Trilogy via a Control Chart.
(Adapted from Juran on Planning for Quality 1988)

Juran concentrates not just on the end customer, but identifies other external and internal customers. This effects his concept of quality since one must also consider the 'fitness of use' of the interim product for the following internal customers. He illustrates this idea via the Quality Spiral.

Joseph Juran's work emphasises the need for specialist knowledge and tools for successful conduct of the Quality Function. He emphasises the need for continuous awareness of the customer in all functions.

The Quality Spiral



The Quality Spiral
(Juran on Planning 1988)

According to Juran, the mission of his recent work is:

- Creating an awareness of the quality crisis of the 1980s
- Establishing a new approach to quality planning, and training
- Assisting companies to re-plan existing processes avoiding quality deficiencies
- Establishing mastery within companies over the quality planning process thus avoiding the creation of new chronic problems.

Juran refers to the widespread move to raise quality awareness in the emerging quality crisis of the early 1980s as failing to change behaviour despite company quality awareness campaigns, or drives, based on slogans and exhortations. Whilst quality awareness was raised, the improved awareness seldom resulted in changed behaviour in the sense of 'doing it right first time'. He sees the failure as due to the campaign's lack of planning and substance:

'The recipe for action should consist of 90% substance and 10% exhortation, not the reverse.'[3]

His formula for results is:

1. Establish specific goals to be reached.
2. Establish plans for reaching the goals.
3. Assign clear responsibility for meeting the goals.
4. Base the rewards on results achieved.

Dr Juran warns that there are no shortcuts to quality and is sceptical of companies that rush into applying Quality Circles, since he doubts their effectiveness in the West. He believes that the majority of quality problems are the fault of poor management, rather than poor workmanship on the shop-floor. In general, he believes that management controllable defects account for over 80% of the total quality problems. Thus he claims that Philip Crosby's Zero Defects approach does not help, since it is mistakenly based on the idea that the bulk of quality problems arise because workers are careless and not properly motivated. Juran believes that, as with Japanese industry, long-term training to improve quality should start at the top, but he knows that this irritates senior management. 'Their instinctive belief is that upper managers already know what needs to be done, and that training is for others - the workforce, the supervision, the engineers. It is time to re-examine this belief.'

[3] *Juran on Planning for Quality 1988*

Further readings:

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Armand V Feigenbaum

Rise to fame

Dr Armand V Feigenbaum is the originator of Total Quality Control. The first edition of his book Total Quality Control was completed whilst he was still a doctoral student at MIT. His work was discovered by the Japanese in the 1950s at about the same time as Juran visited Japan. This discovery came about firstly via his role as Head of Quality at the General Electric Company, where he had extensive contacts with such companies as Hitachi and Toshiba. Secondly, it was associated with the translation of his 1951 book: Quality Control: Principles, Practices and Administration and his articles on Total Quality Control. Feigenbaum argued for a systematic or total approach to quality, requiring the involvement of all functions in the quality process, not just manufacturing. The idea was to build in quality at an early stage, rather than inspecting and controlling quality after the fact.

From 1958 to 1968 Armand Feigenbaum was worldwide Director of Manufacturing Operations and Quality Control at General Electric Company before becoming President of General Systems Company Inc. He was the founding chairman of the International Academy for Quality and is a past president of the American Society for Quality Control,

which presented him with the Edwards Medal and Lancaster Award for his international contribution to quality and productivity. In 1988 he was appointed to the board of overseers of the United States Malcolm Baldrige National Quality Award Programme.

Feigenbaum's message

In his book Quality Control: Principles, Practices and Administration, Feigenbaum strove to move away from the then primary concern with technical methods of quality control, to quality control as a business method. Thus he emphasised the administrative viewpoint and considered human relations as a basic issue in quality control activities. Individual methods, such as statistics or preventive maintenance, are seen as only segments of a comprehensive quality control programme.

Quality control itself is defined as:

'An effective system for co-ordinating the quality maintenance and quality improvement efforts of the various groups in an organization so as to enable production at the most economical levels which allow for full customer satisfaction.'

He stresses that quality does not mean 'best' but 'best for the customer use and selling price'.

The word 'control' in quality control represents a management tool with 4 steps:

1. Setting quality standards
2. Appraising conformance to these standards
3. Acting when standards are exceeded
4. Planning for improvements in the standards.

Quality control is seen as entering into all phases of the industrial production process, from customer specification and sale through design, engineering and assembly, and ending with shipment of product to a customer who is happy with it. Effective control over the factors affecting product quality is regarded as requiring controls at all important stages of the production process.

These controls or jobs of quality control can be classified as:

- New-design control
- Incoming material control
- Product control
- Special process studies.

Feigenbaum argues that statistical methods are used in an overall quality control programme whenever and wherever they may be useful. However such methods are only part of the overall administrative quality control system, they are not the system itself. The statistical point of view, however, is seen as having a profound effect upon Modern Quality Control at the concept level. Particularly, there is the recognition that variation in product quality must be constantly studied within batches of product, on processing equipment and between different lots of the same article by monitoring and critical quality characteristics.

Modern Quality Control is seen by Feigenbaum as stimulating and building up operator responsibility and interest in quality. The need for quality-mindedness throughout all levels is emphasised, as is the need to 'sell' the programme to the entire plant organization and the need for the complete support of top management. Management must recognise that it is not a temporary quality cost-reduction activity. From the human relations point of view, the quality control organization is seen as both:

- A channel for communication for product-quality information
- A means of participation in the overall plant quality programme.

Finally, Feigenbaum argues that the programme should be allowed to develop gradually within a given plant or company.

Feigenbaum's preface to the third edition of Total Quality Control in 1983 emphasises the increased importance of buyers' perceptions of variation in quality between companies and also the variation in effectiveness between the quality programmes of companies.

Quality is seen as having become the single most important force leading to organisational success and company growth in national and international markets. Further, it is argued that:

'Quality is in its essence a way of managing the organization' and that, like finance and marketing, quality has now become an essential element of modern management.

Against this background, Total Quality Control is seen as providing the structure and tools for managing quality so that there is a continuous emphasis throughout the organization on quality leadership: genuine investment in, and implementation of, modern technology for quality throughout sales, engineering and production: and top-to-bottom human commitment to quality and productivity. As Feigenbaum says:

'In effect, quality and its costs are managed and engineered and motivated throughout the organization with the same thoroughness and depth with which successful products and services are themselves managed and engineered and produced and sold and serviced.'

Such Total Quality Control programmes are highly cost-effective because of their results in improved levels of customer satisfaction, reduced operating costs, reduced operating losses and field service costs, and improved utilisation of resources. By-products such as sounder setting of time standards for labour may also be most valuable.

Thus a Total Quality System is defined as:

'The agreed company-wide and plant wide operating work structure, documented in effective, integrated technical and managerial procedures, for guiding the co-ordinated actions of the people, the machines and the information of the company and plant in the best and most practical ways to assure customer quality satisfaction and economical costs of quality.'

Operating quality costs are divided into:

1. Prevention costs including quality planning.
2. Appraisal costs including inspection.
3. Internal failure costs including scrap and rework.
4. External failure costs including warranty costs, complaints etc.

Reductions in operating quality costs result from setting up a total quality system for two reasons:

- Lack of existing effective customer-orientated customer standards may mean current quality of products is not optimal given use
- Expenditure on prevention costs can lead to a several fold reduction in internal and external failure costs.

Feigenbaum today

The new 40th Anniversary edition of Dr A V Feigenbaum's book, Total Quality Control, now further defines TQC for the 1990s in the form of ten crucial benchmarks for total quality success.

These are that:

1. Quality is a company-wide process.
2. Quality is what the customer says it is.
3. Quality and cost are a sum, not a difference.
4. Quality requires both individual and team zealotry.
5. Quality is a way of managing.
6. Quality and innovation are mutually dependent.
7. Quality is an ethic.
8. Quality requires continuous improvement.
9. Quality is the most cost-effective, least capital-intensive route to productivity.
10. Quality is implemented with a total system connected with customers and suppliers.

These are the ten benchmarks for total quality in the 1990s. They make quality a way of totally focusing the company on the customer - whether it be the end user or the man or woman at the next work station or next desk. Most importantly, they provide the company with foundation points for successful implementation of its international quality leadership.

Dr Feigenbaum emphasises that there are three keys to achieving the quality competitive leadership that is so crucial in the global markets of the 1990s. First, is a clear understanding of international markets and of how people buy in these markets; second a thorough grasp of a total quality strategy that provides the business foundation for satisfying these customers; and third, the hands-on management know-how for creating the necessary company environment for quality and for establishing the stretch goals required for quality leadership.

Dr Feigenbaum consistently emphasises in his work that total quality programmes are perhaps the single most powerful change agent for companies today. As a result, company management must assume the responsibility to make a uniquely important leadership contribution that is essential to the growth of their respective companies, to the growth of national economies of which they are part, and, indeed, to improved standards of life for consumers everywhere.

Further reading: **Feigenbaum, A V -** *Total Quality Control,* New York, McGraw-Hill 1983.

THE JAPANESE

Dr. Kaoru Ishikawa

Rise to fame

Professor Ishikawa was born in 1915 and graduated in 1939 from the Engineering Department of Tokyo University having majored in applied chemistry. In 1947 he was made an Assistant Professor at the University. He obtained his Doctorate of Engineering and was promoted to Professor in 1960. He has been awarded the Deming Prize and the Nihon Keizai Press Prize, the Industrial Standardisation Prize for his writings on Quality Control, and the Grant Award in 1971 from the American Society for Quality Control for his education programme on Quality Control. He died in April 1989.

Whilst, perhaps ironically, the early origins of the now famous Quality Circles can be traced to the United States in the 1950s, Professor Ishikawa is best known as a pioneer of the Quality Circle movement in Japan in the early 1960s, which has now been re-exported to the West. In a speech to mark the 1000th quality circle convention in Japan in 1981, he described how his work took him in this direction.

'I first considered how best to get grassroots workers to understand and practise Quality Control. The idea was to educate all people working at factories throughout the country but this was asking too much. Therefore I thought of educating factory foremen or on-the-spot leaders in the first place.'

In 1968, in his role as Chairman of the Editorial Committee of Genba-To-QC (Quality Control for the Foreman) magazine, Dr Ishikawa built upon quality control articles and exercises written by the editorial committee for the magazine, to produce a 'non-sophisticated' quality analysis textbook for quality circle members. The book Guide to Quality Control was subsequently translated into English in 1971, the most recent (2nd) edition being published by the Asian Productivity Organization in 1986. Amongst other books, he subsequently published What is Total Quality Control? The Japanese Way which was again translated into English (Prentice Hall, 1985).

Ishikawa's message-techniques

As with the other Japanese quality gurus, such as Genichi Taguchi, Kaoru Ishikawa has paid particular attention to making technical statistical techniques used in quality attainment accessible to those in industry. At the simplest technical level, his work has emphasised good data collection and presentation, the use of Pareto Diagrams to prioritise quality improvements and Cause-and-Effect (or Ishikawa or Fishbone) Diagrams.

Ishikawa sees the cause-and-effect diagram, like other tools, as a device to assist groups or quality circles in quality improvement. As such, he emphasises open group communication as critical to the construction of the diagrams. Ishikawa diagrams are useful as systematic tools for finding, sorting out and documenting the causes of variation of quality in production and organising mutual relationships between them.

Other techniques Ishikawa has emphasised include control charts, scatter diagrams, Binomial probability paper and sampling inspection.

Company-wide quality

Turning to organisational, rather than technical contributions to quality, Ishikawa is associated with the Company-wide Quality Control movement that started in Japan in the years 1955-1960 following the visits of Deming and Juran. Under this, quality control in Japan is characterised by company-wide participation from top management to the lower-ranking employees. Further, all study statistical methods. As well as participation by the engineering, design, research and manufacturing departments, also sales, materials and clerical or management departments (such as planning, accounting, business and personnel) are involved. Quality control concepts and methods are used for problem solving in the production process, for incoming material control and new product design control, and also

for analysis to help top management decide policy, to verify policy is being carried out and for solving problems in sales, personnel, labour management and in clerical departments. Quality Control Audits, internal as well as external, form part of this activity.

To quote Ishikawa:

'The results of these company-wide Quality Control activities are remarkable, not only in ensuring the quality of industrial products but also in their great contribution to the company's overall business.

Thus Ishikawa sees the Company-wide Quality Control movement as implying that quality does not only mean the quality of product, but also of after sales service, quality of management, the company itself and the human being. This has the effect that:

1. Product quality is improved and becomes uniform. Defects are reduced.
2. Reliability of goods is improved.
3. Cost is reduced.
4. Quantity of production is increased, and it becomes possible to make rational production schedules.
5. Wasteful work and rework are reduced.
6. Technique is established and improved.
7. Expenses for inspection and testing are reduced.
8. Contracts between vendor and vendee are rationalised.
9. The sales market is enlarged.
10. Better relationships are established between departments.
11. False data and reports are reduced.
12. Discussions are carried out more freely and democratically.
13. Meetings are operated more smoothly.
14. Repairs and installation of equipment and facilities are done more rationally.
15. Human relations are improved.

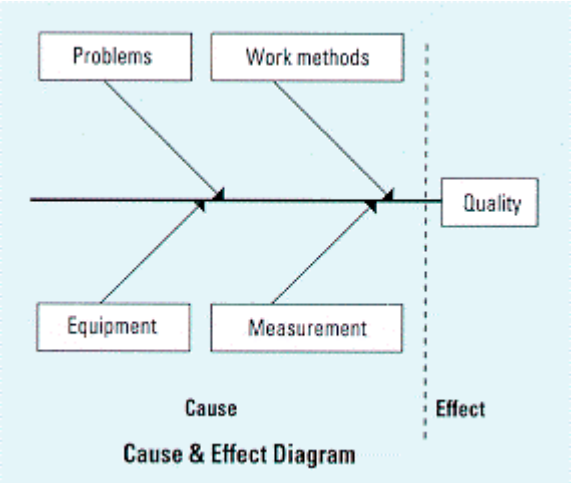
Quality Circle

One major characteristic of Japanese Company-Wide Quality Control is the Quality Control Circle Movement started in 1962, with the first circle being registered with the Nippon Telegraph and Telephone Public Corporation. Starting in industry in Japan, these have now spread to banks and retailing, and been exported world-wide. Success in the West has not been so extensive as in Japan, however, although even there have been limitations too.

The nature and role of quality circles varies between companies. In Japan a quality circle is a typically voluntary group of some 5-10 workers from the same workshop, who meet regularly and are led by a foreman, assistant foreman, work leader or one of the workers. The aims of the quality circle activities are:

1. To contribute to the improvement and development of the enterprise.
2. To respect human relations and build a happy workshop offering job satisfaction.
3. To deploy human capabilities fully and draw out infinite potential.

These aims are broader than is consistent with a narrow definition of quality as often used in the West, and Circle activities reflect this.



Cause & Effect Diagram

The members of the circle have mastered statistical quality control and related methods and all utilise them to achieve significant results in quality improvement, cost reduction, productivity and safety. The seven tools of quality control are taught to all employees:

1. Pareto charts
2. Cause and effects diagrams
3. Stratification
4. Check sheets
5. Histograms
6. Scatter diagrams
7. Shewhart's control charts and graphs.

All members of the circle are continuously engaged in self-and-mutual development, control and improvement whenever possible, the circles implement solutions themselves, otherwise they put strong pressure on management to introduce them. Since management are already committed to the circles, it is ready to listen or act. Circle members receive no direct financial reward for their improvements.

The Japanese experience of quality circles itself provides an insight into the problems of implementation in the West. Strangely enough, however, many companies in the West have attempted to minimise or even cover up the Japanese origins, apparently to avoid cultural rejection on antagonism to 'Japanese workaholics' grounds.

Even in Japan many quality circles have collapsed, usually because of management's lack of interest or excessive intervention. However, many have worked. There are now more than 10 million circle members there. The benefits are typically seen as being minor from any one improvement introduced by a quality circle, but that added together they represent substantial improvements to the company. Perhaps more importantly, greater worker involvement and motivation is created through:

- an atmosphere where employees are continuously looking to resolve problems
- greater commercial awareness
- a change of shopfloor attitude in aiming for ever increasing goals.

Can quality circle be transferred successfully to the West?

Quality circles have been vigorously marketed in the West as a means of improving quality. There seems to be agreement, however, that they cannot be used naively, and take careful adaption for use in Western companies. Adaptations have been various and of varying effectiveness; in some companies circles have been successful, or regarded as such, in others they have failed. Many commentators, such as Philip Crosby, have warned against the fashion for quality circles as a cure-all for poor employee motivation or inadequate quality and productivity in either white-collar areas or on the shopfloor. The senior American Quality Guru Joseph Juran, in particular, has gone further, in throwing doubts on their likely effectiveness in the West at all where few company hierarchies are permitted with executives trained in quality management.

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Dr. Genichi Taguchi

Rise to fame

Dr Genichi Taguchi was born in 1924. After service in the Astronomical Department of the Navigation Institute of the Imperial Japanese Navy in 1942-45, he worked in the Ministry of Public Health and Welfare and the Institute of Statistical Mathematics, Ministry of Education. He learned much of experimental design techniques and the use of orthogonal arrays from the prize-winning Japanese statistician Matosaburo Masuyama whom he met whilst working at the Ministry of Public Health and Welfare. This also led to his early involvement as a consultant to Morinaga Pharmaceuticals and its parent company Morinaga Seika.

In 1950 he joined the newly founded Electrical Communications Laboratory of the Nippon Telephone and Telegraph Company with the purpose of increasing the productivity of its R and D activities by training engineers in effective techniques. He stayed for more than 12 years, during which period he began to develop his methods.

Whilst working at the Electrical Communications Laboratory, he consulted widely amongst Japanese industry. Accordingly, Japanese companies began applying Taguchi methods extensively from the early 1950s, including Toyota and its subsidiaries. His first book, which introduced orthogonal arrays, was published in 1951.

In 1954-5 Taguchi was visiting Professor at the Indian Statistical Institute. During this visit he met the famous statisticians R A Fisher and Walter A Shewhart.

In 1957-8 he published the first version of his two-volume book on Design of Experiments. His first visit to the United States was in 1962 as Visiting Research Associate at Princeton University, during which time he visited the AT & T Bell Laboratories. At Princeton, Taguchi was hosted by the eminent statistician John Tukey who arranged for him to work with the industrial statisticians at Bell Laboratories. In 1962 he was awarded his PhD by Kyushu University.

In 1964 Taguchi became a Professor at Aoyama Gakuin University in Tokyo, a position he held until 1982. In 1966 Taguchi and several co-authors wrote Management by Total Results which was translated into Chinese by Yuin Wu. At this stage, Taguchi's methods were still essentially unknown in the West, although applications were taking place in Taiwan and India. In this period and throughout the 1970s most applications of his methods were on production processes, the shift to product design being in the last decade.

In the early 1970s Taguchi developed the concept of the Quality Loss Function. He published two other books in the 1970s and the third (current) edition of Design of Experiments. By the late 1970s Taguchi had an impressive record in Japan having won the Deming application prize in 1960 and Deming awards for literature on quality in 1951 and 1953.

In 1980 Taguchi was invited by Yuin Wu, who had emigrated to the United States, to give a presentation at his company. By this time Taguchi was director of the Japanese Academy of Quality. During his visit he arranged to revisit AT & T Bell Laboratories at his own cost where he was hosted by Madhav Phadke. Despite communication problems, successful experiments were run that established Taguchi methods within Bell Laboratories.

Following his 1980 visit to the United States, more and more American manufacturers implemented Taguchi's methodology. Despite an adverse reaction among American statisticians at the methods, and possibly at the way they were being marketed, major US companies became involved in the methods including Xerox, Ford and ITT.

In 1982 Taguchi became an advisor at the Japanese Standards Association. In 1984 he again won the Deming award for literature on quality. In 1986 he was awarded the Willard F Rockwell Medal by the International Technology Institute. With one or two notable exceptions, such as Lucas, his methods had made little impact on Europe until the

Institute of Statisticians organised the first conference on the methods in 1987 in London. The UK Taguchi Club (now the Quality Methods Association) was formed later that year.

Taguchi's message

Taguchi methodology is concerned with the routine optimisation of product and process prior to manufacture, rather than emphasising the achievement of quality through inspection. Instead concepts of quality and reliability are pushed back to the design stage where they really belong. The method provides an efficient technique to design product tests prior to entering the manufacturing phase. However, it can also be used as a trouble-shooting methodology to sort out pressing manufacturing problems.

In contrast to Western definitions, Taguchi works in terms of quality loss rather than quality. This is defined as 'loss imparted by the product to society from the time the product is shipped'. This loss includes not only the loss to the company through costs of reworking or scrapping, maintenance costs, downtime due to equipment failure and warranty claims, but also costs to the customer through poor product performance and reliability, leading to further losses to the manufacturer as his market share falls. Taking a target value for the quality characteristic under consideration as the best possible value of this characteristic, Taguchi associates a simple quadratic loss function with deviations from this target.

This loss function shows that a reduction in variability about the target leads to a decrease in loss and a subsequent increase in quality.

With this conception a loss will occur even when the product is within the specification allowed, but is minimal when the product is on target. (If the quality characteristic or response is required to be maximised, eg strength, or minimised, eg shrinkage, then the loss function becomes a half-parabola.) The loss function may be used to evaluate design decisions on a financial basis to decide whether additional costs in production will actually prove to be worthwhile in the market place.

Taguchi methodology can be applied off-line in design or on-line in production.

Taguchi breaks down off-line quality control into three stages:

1. System design.
2. Parameter design.
3. Tolerance design.

System design is the genius of creating a design concept or 'up and limping' prototype. In the past we have been good at this in the West.

Parameter design is the crucial step - this is where the Japanese excel at achieving high quality levels without an increase in cost. The nominal design features or process factor levels selected are tested and the combination of product parameter levels or process operating levels least sensitive to changes in environmental conditions and other uncontrollable (noise) factors is determined.

Finally, tolerance design is employed to reduce variation further if required, by tightening the tolerance on those factors shown to have a large impact on variation. This is the stage at which, by utilising the loss function, more money is spent if necessary buying better materials or equipment, emphasising the Japanese philosophy of invest last not invest first.

The potential for these methods within UK and world industry is large. Typically, designs and line calibrations are in reality far from optimal. Much manufacturing folklore is based on the need to 'twiddle' important parameters or settings. Typically we do not understand the correct settings although we do have our prejudices.

Taguchi methodology is fundamentally a prototyping method that enables the engineer or designer to identify the optimal settings to produce a robust product which can survive manufacturing time after time, piece after piece, in order to provide the functionality required by the customer.

There are perhaps two major features of the advantage of Taguchi methodology. Firstly, it was developed by, and is largely used by engineers rather than statisticians. This removes most of the communication gap and the problems of language traditionally associated with many statistical methodologies. In addition, it means that it is tailored directly to the engineering context. The consequence of this is that the importance of noise variables which disrupt production must be considered in addition to the control variables introduced. Optimising a product corresponds not only to getting its quality characteristics on target but also to minimising variability away from that target on a piece-to-piece or time-to-time basis. This is the connection with Statistical Process Control (SPC).

Taguchi may be used to narrow the spread of the quality characteristics distribution and to identify variables to build control on. SPC may then be used to keep quality characteristics on target by making use of the known spread about the target value. Essentially this is the other novel feature of Taguchi methodology: the use of the so-called Signal-To-Noise ratio to choose the control setting that minimises the sensitivity to noise. In addition to this the methods are fundamentally evolutionary.

One major feature, however, is the codifying by Taguchi of the so-called Orthogonal Arrays. These are designs for experiments which were largely previously identified by others but are codified by Taguchi in such a way that an engineer automatically has a route to the minimum number of prototypes necessary for experimentation. The numbers are kept deliberately small by sacrificing all the interaction information that may be present in the design (or almost all of it) since information about interactions can subsequently be found in typical industrial applications by evaluating one more prototype - that corresponding to the predicted optimum setting (the confirmatory trial). This is the difference between industrial application and the agricultural context on which most of the Western statistical methods which foreran Taguchi were based. In agriculture, responses are slow so that leaving out prototype combinations and sacrificing interactions would necessitate an extra year in the agricultural cycle in order to be able to verify that the predicted prototype combination really was best. In the industrial setting responses are usually fast, so that it is possible to go back immediately and try out one additional prototype. Interactions can, however, be incorporated into Taguchi methodology and he presents a simple graphical codification of these (the linear graphs) to enable the analyst to introduce them systematically and easily. However, only limited numbers can be conveniently introduced without leading to great increase in prototype or experimental sizes.

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Dr. Shigeo Shingo

Shigeo Shingo is perhaps a lesser known Quality Guru in the West, although his impact on Japanese industry, and less directly on Western industry, has been very large. To quote Norman Bodek, President of Productivity Inc.:

'If I could give a Nobel prize for exceptional contributions to world economy, prosperity, and productivity, I wouldn't have much difficulty selecting a winner - Shigeo Shingo's life work has contributed to the well-being of everyone in the world. Along with Taiichi Ohno, former vice president of Toyota Motors, Mr Shingo has helped revolutionise the way we manufacture goods. His improvement principles vastly reduce the cost of manufacturing - which means more products to more people; they make the manufacturing process more responsive while opening the way to new and innovative products, substantially reduce defects and improve quality, and give us a strategy for continuous improvement through the creative involvement of all employees.'(4)

Shingo's approach emphasises production rather than primarily management. His motto (actually one of very many) is that 'Those who are not dissatisfied will never make any progress'. He believed that progress is achieved by careful thought, pursuit of goals, planning and implementation of solutions. Shingo died in November 1990 at the age of 81.

(4) *Foreword to The Sayings of Shigeo Shingo, English translation by Andrew P. Dillon, Productivity Press 1987*

Rise to fame

Shingo was born in Saga City, Japan in 1909, and graduated in Mechanical Engineering from Yamanashi Technical College in 1930, whereupon he was employed by the Taipei Railway Factory in Taiwan. There he introduced scientific management.

Subsequently he became a professional management consultant in 1945 with the Japan Management Association. He later became manager of the Education Department, of the Computing Department, and the Fukioko Office. It was in his role as Head of the Education Department that in 1951 he first heard of, and applied, statistical quality control. By 1954 he had investigated 300 companies. In 1955 he took charge of industrial engineering and factory improvement training at the Toyota Motor Co for both its employees and parts suppliers (100 companies).

During the period 1956-58 at Mitsubishi Heavy Industries in Nagasaki, Shigeo Shingo was responsible for reducing the time for hull assembly of 65,000 tons super-tanker from 4 months to 2 months. This established a new world record in shipbuilding, and the system spread to every shipyard in Japan.

In 1959 he left the Japan Management Association and established the Institute of Management Improvement, with himself as President. In 1962 he started industrial engineering and plant-improvement training at Matsushita Electric Industrial Company. As previously, training was done on a large scale, with some 7,000 persons trained.

It was in the period 1961-1964 that Shigeo Shingo extended the ideas of quality control to develop the Poka-Yoke, mistake-proofing or 'Defects = 0' concept. Subsequently the approach was successfully applied at various plants with records of over two years totally defect-free operation being established.

In 1968 at the Sata Ironworks he originated the Pre-Automation system which later spread throughout Japan. He was awarded a Yellow Ribbon Decoration for his distinguished services in improving production in 1970. Also in that year he originated the SMED System at Toyota (Single Minute Exchange of Die) which is part of the Just in Time system.

Shigeo Shingo's first overseas study tour was in 1971. He visited Europe in 1973 at the invitation of Die casting Associations in West Germany and Switzerland. He conducted practical training at Daimler Benz and Thurner in West Germany, and H-Weidman Ltd, Bucher-Guyer AG and Gebr Buhler Ltd in Switzerland. He visited Livernos Automation in the USA in 1974, and from 1975 to 1979 he conducted training for the American Company Federal Mogul on SMED and Non-stock Production. His first consultancy for an overseas firm was for Citroen in France in 1981.

Other companies where he advised include many parts of Daihatsu, Yamaha, Mazda, Sharp, Fuji, Nippon, Hitachi, Sony and Olympus in Japan, and Peugeot in France. The use of his methods within the US company Omark Industries led to such increased productivity, defect and stock reductions that the company instigated the annual Shingo award to the facility which, out of the seventeen World-wide, demonstrated the best overall improvement.

Shingo wrote more than 14 major books. Several have been translated into English and other European languages, especially his book on the Toyota Production System.

Shingo's message

In terms of quality, Shingo's paramount contribution was his development in the 1960s of poka-yoke and source inspection systems. These developed gradually as he realised that statistical quality control methods would not, in themselves, reduce defects to zero.

The basic idea is to stop the process whenever a defect occurs, define the cause and prevent the recurring source of the defect. No statistical sampling is therefore necessary. A key part of this procedure is that source inspection is employed as an active part of production to identify errors before they become defects. Error detection either stops production until the error is corrected, or it carries adjustment to prevent the error from becoming a defect. This occurs at every stage of the process by monitoring potential error sources. Thus defects are detected and corrected at source, rather than at a later stage. Typically, this process is made possible by instrumenting machines with

immediate feedback; reliance on the fallible judgment of personnel is minimised. They are essential, however, to establish the potential error sources.

Following a visit to Yamada Electric in 1961, he started to introduce simple, mechanical or physical devices into assembly operations, which prevented parts being assembled incorrectly and immediately signalled when a worker had forgotten one of the parts. These mistake-proofing or 'poka-yoke' devices had the effects of reducing defects to zero.

In 1967 Shingo further refined his work by introducing source inspections and improved poka-yoke systems which actually prevented the worker from making errors so that defects could not occur. Associated advantages were that statistical sampling was no longer necessary, and that workers were freer to concentrate on more valuable activities such as identifying potential error sources.

Having learned about and made considerable use of statistical quality control in his 40s, it was some 20 years later in 1977 that Shingo was 'finally released from the spell of statistical quality control methods' when he saw how the Shizuoko plant of Matsushita's Washing Machine Division had succeeded continuously for one month with zero defects on a drain pipe assembly line involving 23 workers. This was achieved principally through the installation of poka-yoke devices to correct defects and source inspection to prevent defects occurring. Together these techniques constitute Zero Quality Control, which, Shingo argues, can achieve what may have been impossible using statistical quality control methods.

Shingo emphasised the practical achievement of zero defects by good engineering and process investigation, rather than an exhortation/slogan emphasis that has been associated with the quality campaigns of many American and Western companies. Shingo himself, like Deming and Juran, showed concern at such American approaches, arguing that posting defect statistics is misguided, and that instead the defectives should be hunted down.

The SMED system was born out of necessity, in order to achieve Just-In-Time production, one of Toyota's manufacturing corner-stones. This system was developed to cut set-up times, enabling smaller batch sizes to be produced. The set-up procedures were simplified by using common or similar set-up elements whenever possible. This approach was in complete contrast with traditional manufacturing procedures, as Shingo pointed out: 'It is generally and erroneously believed that the most effective policies for dealing with set-ups address the problem in terms of skill. Although many companies have set up policies designed to raise the skill level of the workers, few have implemented strategies that lower the skill level required by the set-up itself.'[5]

The success of this system was illustrated in 1982 at Toyota, when the die punch set up time in cold-forging process was reduced over a three-month period from one hour and forty minutes to three minutes.

[5] *Zero Quality Control - Shingo*

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THE NEW WESTERN WAVE

Philip B Crosby

Philip Crosby is a particularly well-marketed and charismatic Quality Guru. An article in the Financial Times a few years ago described him thus:

'Florida has provided him with a year-round tan. That, and his thinning golden hair and snappy dress give him the look of a sunbelt Senator rather than a man from the quality department. He does have a campaign button in his lapel. It says ZD, of course, for Zero Defects.'[6]

[6] *Financial Times 26 November 1986*

Rise to fame

Crosby is a graduate of the Western Reserve University. After naval service in the Korean War, he held a variety of quality control jobs starting as line inspector. One early experience was as quality manager on the first Pershing missile programme. He worked his way up within ITT and for fourteen years he was a Corporate Vice President and Director Quality of ITT, with world-wide responsibilities for quality.

In 1979 he published Quality is Free, which became a bestseller. In response to the interest shown in the book, he left ITT that year to set up Philip Crosby Associates Incorporated. At the Quality College established in Florida he started to teach organizations how to manage quality as advocated in his book.

Crosby published his second bestseller, Quality Without Tears in 1984, and he is also the author of The Art of Getting Your Own Sweet Way. More recently he has published a group of three management books, Running Things, The Eternally Successful Organization and Leading: The Art of Becoming An Executive.

Crosby's message

Crosby's name is perhaps best known in relation to the concepts of Do It Right First Time and Zero Defects. He considers traditional quality control, acceptable quality limits and waivers of sub-standard products to represent failure rather than assurance of success. Crosby therefore defines quality as conformance to the requirements which the company itself has established for its products based directly on its customers' needs. He believes that since most companies have organizations and systems that allow (and even encourage) deviation from what is really required, manufacturing companies spend around 20% of revenues doing things wrong and doing them over again. According to Crosby this can be 35% of operating expenses for service companies.

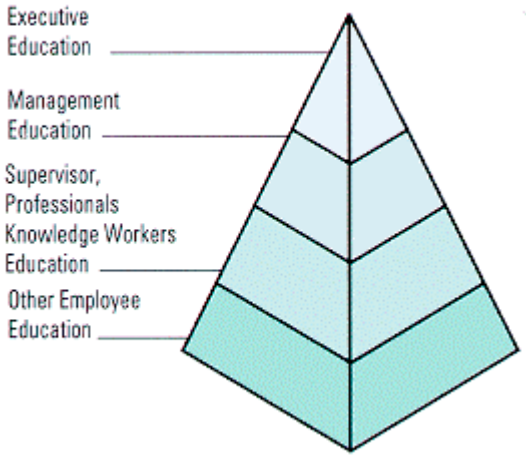
He does not believe that workers should take prime responsibility for poor quality; the reality, he says, is that you have to get management straight. In the Crosby scheme of things, management sets the tone on quality and workers follow their example; whilst employees are involved in operational difficulties and draw them to management's attention, the initiative comes from the top.

What zero defect means is not that people never make mistakes, he says, but that the company does not start out expecting them to make mistakes.

As indicated earlier, not everyone agrees with this approach to quality. As Crosby himself said:

'I never received any encouragement from the quality establishment. These are ideas whose time has come. This was an idea whose time had come, but it took 20 years before people realised it.'

Financial Times 26 November 1986



Quality Without Tears - Crosby 1984

In the Crosby approach the Quality Improvement message is spread by creating a core of quality specialists within the company. There is strong emphasis on the top-down approach, since he believes, without reservation, that senior management is entirely responsible for quality.

His goal is to give all staff the training and the tools of quality improvement, to apply the basis precept of Prevention Management in every area. This is aided by viewing all work as a process or series of actions conducted to produce a desired result. A process model can be used to ensure clear requirements have been defined and understood by both the supplier and the customer. He also views quality improvement as an ongoing process since the word 'programme' implies a temporary situation.

Crosby's Quality Improvement Process is based upon the...

Four Absolutes of Quality Management:

1. Quality is defined as conformance to requirements, not as 'goodness' nor 'elegance'.
2. The system for causing quality is prevention, not appraisal.
3. The performance standard must be Zero Defects, not 'that's close enough'.
4. The measurement of quality is the Price of Non-conformance, not indices.

The Fourteen Steps to Quality Improvement are the way that the Quality Improvement Process is implemented in an organization. They are a management tool which evolved out of a conviction that the Absolutes should be defined, understood, and communicated in a practical manner to every member of the organization:

1. Make it clear that management is committed to quality.
2. Form quality improvement teams with senior representatives from each department.
3. Measure processes to determine where current and potential quality problems lie.
4. Evaluate the cost of quality and explain its use as a management tool.
5. Raise the quality awareness and personal concern of all employees.
6. Take actions to correct problems identified through previous steps.
7. Establish progress monitoring for the improvement process.
8. Train supervisors to actively carry out their part of the quality improvement programme.
9. Hold a Zero Defects Day to let everyone realise that there has been a change and to reaffirm management commitment.
10. Encourage individuals to establish improvement goals for themselves and their groups.
11. Encourage employees to communicate to management the obstacles they face in attaining their improvement goals.
12. Recognise and appreciate those who participate.

13. Establish quality councils to communicate on a regular basis.
14. Do it all over again to emphasise that the quality improvement programme never ends.

In Quality is Free, Crosby identifies additional quality-building tools, including the Quality Management Maturity Grid which enables a company to measure its present quality position. In Quality Without Tears he develops the Quality Vaccine which comprises twenty one ingredients for Executives to use to support the implementation process.

As his books on leadership reflected his broadening approach to improvement, he defined five new characteristics essential to becoming an Eternally Successful Organization:

1. People routinely do things right the first time.
2. Change is anticipated and used to advantage.
3. Growth is consistent and profitable.
4. New products and services appear when needed.
5. Everyone is happy to work there.

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Tom Peters

Rise to fame

Tom Peters is an American who has researched the secrets of successful American companies. His philosophies of the Quality Improvement Process have evolved mainly as a result of these experiences combined with, it seems, his sales-orientated viewpoint.

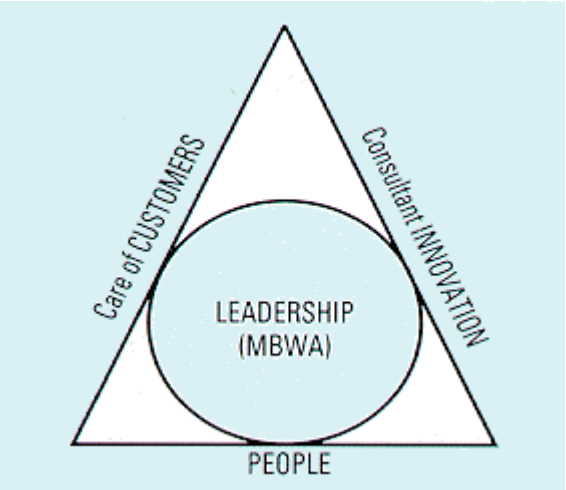
Peters was educated in engineering and business and spent the early part of his career on active duty in the Navy. He was a principal at McKinsey and Co when he began researching his book In Search of Excellence. He left in 1981 to found his own companies, now known as the Tom Peters Group. The book, published in 1982, painted a broad brush picture of the facts behind excellent performance within 43 large American Companies.

His second book A Passion for Excellence was published in 1985 with co-author Nancy Austin. A video of the same name was released to illustrate some of the case studies in the book.

Thriving on Chaos, his third book, was published in 1988 in the UK. Its aim was to prescribe ways of bringing about the Management Revolution which Peters regards as increasingly necessary, based on his widening experience.

Peters' message

In his second book, Tom Peters identified leadership as being central to the Quality Improvement Process. He considered that the word 'management' should be discarded in favour of 'leadership'. The new role should be that of a cheerleader, and facilitator. He sees Managing by Wandering About (MBWA) as the basis of leadership and excellence because it enables the leader to keep in touch with Customers, Innovation, and People, the three major areas in the pursuit of 'excellence'.



He labels MBWA the 'Technology of the Obvious' and believes that as the effective leader wanders, at least three major activities are going on:

1. Listening - suggests caring.
2. Teaching - values must be transmitted when face to face.
3. Facilitating - able to give on-the-spot help.

By the late 1980s he was using the term 'management obsession' and considered that leaders must learn to love change in order to be proactive in a world of chaos.

However in his most recent book, he no longer appears to portray leadership, or MBWA in particular, as the central issue. Instead, he devotes equal discussion to the four familiar areas of customers, innovation, people and leadership. The customer aspect is discussed first, perhaps reflecting his evolving views. (It is interesting that he progressively devotes one, five, then ten chapters to customers in each book.) He allows a final shorter discussion to a new area - systems.

Each area is discussed in terms of 'prescriptions', since Peters views the 'nice-to-do' approach of the late 1970s as a 'must-do' in the late 1980s. He considers that each of the forty-five prescriptions urgently calls for a radical reform. They evolved out of the perceived desire by managers to move beyond the case studies.

The first four of Peter's five areas consists of ten prescriptions each, whilst 'Systems' is made up of five. All five sets of prescriptions commence with the guiding premise, as the introductory section. This is followed by several prescriptions describing tools, key strategies, and tactics for implementation of excellence. Finally each area is concluded by describing the first steps which could be taken.

Tom Peters is probably best known for his customer orientation. In the section of thriving on chaos concerning customer responsiveness, he describes twelve attributes, or traits of a quality revolution. These, he bases on shared characteristics which he has perceived amongst the successful quality improvement programmes of the top American companies. The twelve traits are:

1. Management obsession with quality

This stresses the importance of practical action to back up the emotional commitment, eg halving the number of rework mechanics, never walking past shoddy goods.

2. Passionate systems

Failure is invariably due to passion without system, or system without passion Peters believes. Both are necessary and an ideology is important whether based on Gurus or not.

3. Measurement of quality

This should begin at the outset of the programme, should be displayed, and should be carried out by the participants.

4. Quality is rewarded

Quality based incentive compensation can cause an early breakthrough in top management's attitude.

5. Everyone is trained for quality

Every person in the company should be extensively trained. Instruction in cause and effect analysis, statistical process control, and group interaction should be given to all.

6. Multi-function teams

Quality Circles, or cross functional teams such as Error Cause Removal or Corrective Action Teams should be introduced. Based on his experience Peters favours cross functional teams.

7. Small is beautiful

There is no such thing as a small improvement. There is significance in the fact that a change has occurred.

8. Create endless 'Hawthorne' effects

This is the antidote to the 12-18 month doldrums. New goals, new themes, new events are the antidote.

9. Parallel organization structure devoted to quality improvement

This describes the creation of shadow quality teams and emphasises that it is a route through which hourly paid workers can progress.

10. Everyone is involved

Suppliers especially, but distributors and customers too, must be part of the organizations quality process. Joint improvement teams may be formed.

11. When quality goes up, costs go down

Quality improvement is the primary source of cost reduction. The elementary force at work is simplification - of design, process or procedures for example.

12. Quality improvement is a never-ending journey

All quality is relative. Each day, each product or service is getting relatively better or worse, but never stands still:

The twelve traits raise some contradictions with other approaches:

- Trait 9 regarding the separate quality organization is not a general view
- Also, Peters' programme starts by covering the whole organization, but the alternative strategy is to address single departmental problems
- Thirdly, Peters has developed strong opinions regarding the vital involvement of external suppliers and customers, as in Trait 10.

Further readings:

Peters, T J et al - *In Search of Excellence,* Harper & Row, 1982.

Peters, T J et al - *A Passion for Excellence,* Random House Inc, 1985.

Peters, Tom - *Thriving on Chaos,* USA, Alfred A Knopf Inc, 1987, London, MacMillan, 1988.

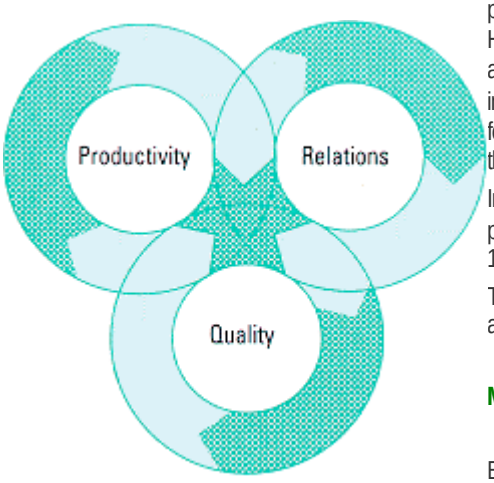
Claus Moller

Rise to fame

Our last Guru is unusual in that he is European and relatively young, in his late forties. Claus Moller, the 'Victor Borge of Business', is a Danish business economist who was educated in Copenhagen. His company (Time Manager International) was founded in 1975. Over the following ten years TMI developed its own Time Management Course -

which utilises the Time Manager Results Tool. The company also runs other management courses, and 'Putting People First' Programmes. In the mid 1980s, these PPF Programmes were run for several airlines. In co-operation with JALCOS, a subsidiary of Japan Airlines, TMI adapted the Programme for the Japanese culture. Since 1984 the Company has been providing management training in the Soviet Union as a contribution to Perestroika and the modernisation of the Soviet economy.

During 1987 Claus Moller's company won the public tender, in competition with 48 other companies, for the second phase of modernisation for some 16,000 people within the EEC. His programme 'Management for Everyone' was designed to lead all staff towards greater job satisfaction and team identity. It involved improving work organization and interpersonal relations for Commission workers in Brussels and Luxembourg, including the reduction of bureaucracy and the improvement of productivity.



TMI World - 1990

In late 1987 the BBC made a programme about Claus Moller, as part of the 'Business Matters' series which was broadcast in April 1988 and is available as a BBC training video.

TMI has more recently become involved with Quality Management, and Claus Moller's book, Personal Quality, was published in 1988.

Moller's message

By the late 1970s, 30 years of statistical quality control and a variety of mottoes had combined to significantly improve the quality of the product and the production process. The emphasis on customer requirements was increasing, as a mutual progression and, so, in the early 1980s, a serious interest in quality of services and human relationships started to develop. Through his experiences Moller became convinced that the administrative process rather than the production process, offered more opportunity for overall productivity gains.

In order to improve service to the customer, Moller believes that the people who produce the goods must be inspired to do their best, and that huge cultural adjustment is required by all. Moller believes this will only be mastered by improving the personal development of the individual. This will lead to increased competence in the three vital areas of Productivity, Relations and Quality. TMI sees these three areas as 'evergreens', not fads, but intrinsic to all people's lives and so closely interwoven that they presuppose each other.

Moller sees Personal Quality as the basis of all other types of quality. In his book Personal Quality, two standards of personal quality are identified: the ideal performance level (IP) and the actual performance level (AP).

The ideal performance level is the individual's personal quality goal, and is a value influenced by experiences in the formative years. Therefore the IP level will fluctuate in the early years and stabilise as adulthood is reached, to be influenced only by strong emotional experiences. The IP level has a decisive effect on the individual's development and future opportunities.

Actual performance (AP) level is influenced by the individual's self-esteem, the 'OK-feeling' experienced with the AP level matching the IP level. The AP level is influenced by recognition or reprimands, understanding the goals and 'knowing why' a specific task is to be performed. Several other factors influence the AP level - success or failure, the environment, experience and skills, the nature of the task, the time available, others' AP levels, and the individual's IP level.

Moller presents twelve Golden Rules to help improve the AP level.

These are:

1. Set personal quality goals.
2. Establish your own personal quality account.
3. Check how satisfied others are with your efforts.
4. Regard the next link as a valued customer.
5. Avoid errors.
6. Perform tasks more effectively.
7. Utilise resources well.

8. Be committed.
9. Learn to finish what you start - strengthen your self-discipline.
10. Control your stress.
11. Be ethical - maintain your integrity.
12. Demand quality.

In addition, Moller has developed two simple techniques for raising personal quality:

- The 'do/check' system (continuous self-checking the quality of performance)
- The quality business card. (Devise a card which is a personal guarantee of quality of work.)

In his book, Moller also recommends ways to raise the IP level of young people, and discuss the links of Personal Quality to Departmental, Product, Service and Company Quality.

Concerning Company Quality, he identifies 17 hallmarks of a quality company. These are:

1. Focus on quality development
Quality development is just as much a part of company life as budgets and accounts.

2. Management participation in the quality process
Management visibly strives to meet the high standards the programme sets for efficiency and human relations.

3. Satisfied customers/users
They remain loyal to the company.

4. Committed employees
Employees thrive. Turnover and absenteeism are well below normal.

5. Long-term quality development
The company invests more in long-term quality development than in short-term profits.

6. Clearly-defined quality goals
Quality goals for all areas clearly defined. Results are publicised.

7. Quality performance rewarded
Quality performance is rewarded visibly, and is a prerequisite for promotion.

8. Quality control perceived positively
Quality control is not perceived as a sign of distrust, but rather as a means to develop and maintain quality.

9. Next person in work process is a valued customer
No link/person in the chain should suffer because of mistakes made by others.

10. Investments in personnel training and development
Employees are the company's most important resource.

11. Prevention/reduction of mistakes
Sizable investments are made to prevent and limit mistakes.

12. Appropriate decision level
The level of decision-making is placed no higher in the organization than necessary.

13. Direct route to end users
Products and services are produced and delivered by the most direct method available.

14. Emphasis on both technical and human quality

15. Company actions directed towards customer needs
Meeting the customer's needs is reflected in all company actions.

16. Ongoing value analysis
Work which does not create 'value' is dropped.

17. Company recognition of its role in society
The company assumes its role in contributing to society.

Further reading: **Moller, C** - *Personal Quality,* Denmark, Time Manager International A/S, 1987.