

**The benefits and difficulties of implementing a quality cost programme in an organization.**

# The Role of the Quality Assurance Professional in Determining Quality Costs

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In recent years a great deal of interest in quality issues has been stimulated worldwide with the introduction of the Baldrige Award in the United States and the European Quality Award[1]. The European Foundation for Quality Management (EFQM), which was formed when 14 of the top companies signed the Letter of Intent in September 1988, acts as a catalyst and is actively promoting total quality management (TQM) to top companies throughout Europe[2]. TQM is the process of continuous improvement and involves analysing key areas to be addressed by the company or organization, planning for improvements, executing these plans, constant monitoring, and making changes which will improve their performance. Every organization is different and therefore has different requirements from a TQM programme. A number of common areas which tend to be addressed are relationships with suppliers, personal development and involvement of personnel,

and determining the true cost of product or service quality.

This article seeks to illustrate the difficulties experienced with quality costs by two professionals working in very different TQM environments. Company A manufactures and assembles computers and is working at the forefront of advanced technologies. Company B produces products which are used by the steel industry and is more representative of "traditional" industries, even though they employ new technologies.

The term quality costs is used throughout to mean the costs associated with achieving required quality standards combined with the costs associated with not meeting the required standards. Both companies have set up programmes to investigate, analyse, and address quality costs within their manufacturing operations. The quality assurance (QA) managers were asked to consider the main problems that they had had or were experiencing with their respective quality cost programmes. Interviews were then conducted.

QA managers throughout the UK are becoming more professional and this is being achieved through membership of the Institute of Quality Assurance, professional examinations, and training programmes. The first part of this article indicates the level of involvement in quality assurance in the UK. Total quality management is then outlined and the elements of quality costs are explained before examining the problems encountered by the two QA managers.

## The Quality Assurance Professional

In recent years, a new area of managerial professionalism has developed, i.e. the quality assurance manager. His or her duties can vary enormously depending on the industrial, commercial, local government or public organization for which they work. Because of the nature of organizations and their development, quality assurance differences exist within sectors and within similar organizations. However, the quality assurance professional is, in the main, continuously seeking to improve the quality of product or service offered to the customer. These professionals are dealing, not only with British Standards and Certification, but also with people, quality assurance management techniques and strategic corporate issues such as quality costs.

The Institute of Quality Assurance (IQA) currently has over 12,500 members. More than half of the membership has at least one degree (approximately 56 per cent), and a high proportion hold a minimum of Higher National Certificates (HNC). Membership of the Institute is not restricted to manufacturing industry, but covers service

industries, local authorities, and education as well as training.

The American Society for Quality Control (ASQC) currently has 117,000 members worldwide. The auditing specialist group of the ASQC had 400 members in January 1992, 4,000 by September 1992 and had exceeded 7,000 members by May 1993[3].

Membership of the IQA will continue to grow because of the need for organisations to compete at home and abroad. It is reputed that the IQA is the fastest growing professional institute in the UK. A study, by the National Economic Development Office (NEDO) in the 1970s[4], illustrated how important quality was to the UK and this study, together with others, led to Command Paper 8621 *Facing International Competition* in 1982[5]. The DTI launched the UK's Quality Campaign in 1983 with the objectives of improving competitiveness, raising awareness and improving the quality of British goods and services. Senior

management were introduced to the quality concept via seminars, videos and publications such as *The Case for Quality*[6] which emphasized some of the important issues from *Facing International Competition*.

The quality assurance professional is usually part of the management team and, as such, can have a very wide range of duties and responsibilities which are associated with the quality of goods or services provided by the organization, internally as well as externally.

Table I illustrates the wide range of backgrounds of members of the IQA. These figures are from 1988 and, out of a total of 1,095 new members (all grades), 86 per cent of those granted membership fell into ten main classifications. In this particular study, there were 97 different classifications. Perhaps the key data from the Table are the first set of figures which show that 218 quality assurance professionals came from new technology-based occupations. This Table clearly

**Table I.** Grades and Occupational Classification of the Institute of Quality Assurance's 1988 Membership Intake

Grade/classification	Fellow	Member	Associate Member	Licentiate	Student	Associate	Total
Electrical and electronic engineering inc. Computers/software	6	37	60	66	3	46	218
Engineering	3	30	36	53	9	65	196
Consultants /inspection services	3	48	12	14	–	17	94
Buildings/construction /concrete	–	25	5	9	1	11	51
Medical/pharmaceutical /health services	1	19	4	21	4	1	50
Teaching/studying	2	13	1	8	16	5	45
Motor vehicle/tractor /automotive components	–	7	10	10	–	9	36
Aircraft manufacture /aerospace	1	8	8	9	1	8	35
Petrochemicals	2	8	6	6	–	8	30
Iron, steel, aluminium production	–	4	8	10	–	8	30
Totals	18	199	150	206	34	178	785

Source: The Institute of Quality Assurance

shows that the quality profession has permeated beyond manufacturing industries.

Various membership grades can be awarded by the IQA's membership committee. The grade of Fellow is reserved for those who have made an important contribution to quality assurance. Generally speaking, the grade of Corporate Member is achieved by a combination of holding a degree or chartered status, passing the Institute's "Quality Management" paper, having relevant quality assurance work experience, and being aged at least 26. The Institute's "Quality Management" paper, A3, is covered in approximately one year of part-time study and, regardless of degree or work experience status, is mandatory for membership.

Recently, a number of significant changes have taken place. These include:

- A new Scotvec Higher National Unit, "Quality Assurance Management", has been accepted by the IQA as an equivalent to the A3 paper, thus offering wider access.
- The Scottish Quality Management Centre (SQMC), University of Stirling, is one of a small number of UK institutions to have been awarded the "Centre of Excellence" accolade by the IQA. At undergraduate level, students who study quality assurance in their final years, and who pass the course units on *Quality Systems* as well as *Total Quality Management*, are accepted by the Institute as Licentiates. This means that those graduates who go on to a career in quality assurance will be able to apply for Corporate Membership after two years of relevant experience provided that they have reached the appropriate age. At postgraduate level, those students who achieve the Master of Science in Quality Management, which is a one-year, full-time taught course, can apply for full Corporate Membership. Again, provided that they have relevant practical quality assurance experience and are aged 26 or above.

Other necessary training for the quality assurance professional relates to the international Quality Systems Standard (ISO 9000/BS 5750 series) and also auditing (ISO 10011/BS 7229), which is an integral part of achieving, as well as maintaining, the standard. These developments in training as well as education are significant, particularly with the involvement of universities, in that they will continue to develop the professionalism of the Institute's membership in the years to come.

### Total Quality Management

"Total quality management (TQM) is the system of activities directed at achieving delighted customers, empowered employees, higher revenues, and lower costs"[7].

In recent years there has been a growing awareness of the importance of the "customer", internally as well externally, to an organisation[8]. Greater emphasis is now being placed on customer satisfaction and more effort is being expended on broad quality concepts. Increased participation of employees is also being encouraged in a growing number of organizations. These activities form the basis of what is known as total quality management or TQM.

Perhaps the key area in ensuring the success of a TQM programme in an organization is commitment. TQM is a long-term strategic issue which is about continuous improvement in all areas of the organization's activities. Therefore, commitment must start with top management and then be gained from each individual employee.

Not only is commitment needed, but also a systematic approach to the achievement of TQM improvements requires that the organization has the necessary infrastructure of people, systems and training. These must either be in place, or be in planning.

The three major components of TQM are:

- (1) A quality assurance system.
- (2) Quality tools and techniques.
- (3) Teamwork[9].

In the foreword to *BS 7850: Total Quality Management, Part 1. Guide to Management Principles*, it states that "Total quality management assures maximum effectiveness and efficiency within an organization by putting in place processes and systems which will ensure that every aspect of its activity is aligned to satisfy customer needs and all other objectives without waste of effort and using the full potential of every person in the organization"[10]. Thus the philosophy of TQM is intertwined with pragmatic elements to achieve the required goals.

The basis for a quality assurance system is the ISO 9000 series, "Quality Systems"[11,12]. Certification to this standard is being heavily promoted, not only in the UK, but also in the USA, throughout Europe and many other parts of the world.

A survey of UK BS 5750-certified companies, carried out in February 1992 by the Institute of Directors, illustrated the growth of quality systems achievement in the UK:

- At 31 December 1989 there were 8,100.
- By 31 December 1990 there were 11,000.
- By the end of 1991, 15,570 had achieved certification.

The quality system standard tends to be a good starting-point for TQM, as a fairly robust administrative system can be put into place and built on. Although the British Standard was originally oriented towards manufacturing, other standards have been issued which give guidance to service organizations[13] and software development[14].

The tools and techniques associated with TQM range from the very simple, such as histograms, to complex, customer-driven project control using quality function deployment (QFD)[15] which involves all functions of the organization in improving the product or service for the customer. Many of these tools and techniques have been used in British industry in the past, for example, tally sheets. However, the current drive and interest have been stimulated by the success of Japanese industry in controlling processes. The work of certain authors, such as Ishikawa, has done much to bring new concepts to maintaining quality standards. Ishikawa's *Guide to Quality Control*[16] was first published in 1971 and includes techniques such as "Pareto Analysis" and "Cause and Effect diagrams". It is now being used extensively in quality management education.

*BS 7850: Total Quality Management, Part 2. Guide to Quality Improvement Methods*[17], which includes explanations and examples of tools and techniques, has been issued to give guidance on implementing continuous quality improvement. By combining both parts of the standard, guidance on the "people" element of TQM emerges which includes training and education, participation, and how to involve the whole organization. Through teamwork, complex problems can be tackled which would be too big for individuals to solve. Problems which may be on the interface between departments or functions can be addressed by a multi-disciplinary team, and recommendations for change or improvement are more likely to be accepted[18]. Very often, changes and improvements can be obstructed owing to cultural problems within the organization[19]. Although this can be looked on as a management of change issue, attitudes may have to be changed in individuals, work groups or sections of management. A dedicated group, or team, can be formed to identify problems and formulate relevant training and awareness programmes.

In many ways, better quality and continuous improvement not only are profitable as the organization is providing what the customer wants, but also provide a sense of purpose for staff as well as linking quality goals with organizational goals[20]. A survey of 358 organizations, carried out in 1990[21], set out to

determine understanding, commitment, training needs, and the difficulties associated with TQM. Most of the organizations were located in the UK and The Netherlands, with approximately two-thirds involved in manufacturing and the rest in services and commerce. The top five factors (from a list of 15) of what TQM means to an organization were:

- (1) satisfying external customers;
- (2) reducing costs;
- (3) partnership with customers;
- (4) employee involvement and development;
- (5) each person satisfying their internal customers.

It is interesting to note from the survey that the dominant area where training appears to be most urgently required is the interaction of TQM and marketing.

Quality costs is an integral part of a TQM programme. Crosby argues that "quality is free"[22] and what he means by this is that the costs of achieving quality are offset by the savings in quality improvements. Regardless of whether the organization is in the manufacturing, service, or public sectors, by analysing processes, involving people, and making improvements, then problems can be addressed and savings made[23].

### Quality Costs

It was estimated that quality costs, i.e. the cost of achieving/not achieving the required quality standard of goods produced by UK establishments, cost the UK approximately 10 per cent of GNP, or £10 billion, in 1978. It has also been indicated from studies that quality costs can be as high as 25 per cent of sales turnover[24].

The term "quality costs" tends to be very difficult to define and it can mean different things to different organizations. Even individuals within the same organization can have different understandings. Over and above the difficulty of understanding what quality costs may mean, the requirements tend to vary between industry sectors as well as the variation in requirements for manufacturing and service organizations. To some it means the cost of achieving a level of quality for their product or service; to others it may mean determining the cost of where things have gone wrong; and to others it may relate to the way that they identify how they get things right first time, which areas they have to target for quality improvement, and how they organize the cost administration in a way that costs can be monitored and controlled.

The definition of quality-related costs from BS 4778 is "Cost in ensuring and assuring quality as well as loss incurred when quality is not achieved"[25], and these costs can be classified into three main categories:

prevention, appraisal and failure. This is known as the PAF model and has been used in one form or another since the 1950s[26,27,28]. The aim of a quality cost improvement programme is to shift the costs from the failure category to prevention. Thus leading to cost savings on overheads as well as expense items.

The British Standard, *Guide to the Economics of Quality. Part 2. Prevention, Appraisal and Failure Model*[29], makes it clear that to be successful in business requires financial planning and control. The Standard then goes on to make users aware of two very relevant and important facts: first, “failures, however caused, reduce profits” and second, “preventive quality control activities and the appraisal of quality standards cost money to operate”. Both of these facts should be kept in mind when dealing with quality costs. The standard has been criticized for a number of reasons including the difficulties in putting it into practice[30].

As a basis for quality improvement, a quality cost system can play a significant role. Potentially, a quality cost system can become an important tool to be used in the management of the organization[31]. There are many representations of how the costs can be allocated into PAF categories. For example, Adam and Evert[32] use a table drawn up in 1968 to illustrate how costs may be identified and addressed:

- (1) *Prevention costs* arise in the course of preventing, investigating or reducing the risk of nonconformities or defects. Prevention costs may include:
  - *Quality planning* – may take different forms in different organizations. However, planning activities generally means that, should something go wrong, then it can be dealt with in a systematic manner. Prevention of any sort requires careful thought to avoid problems.
  - *Supplier assurance* – will include site visits, inspection and quality audits to ensure that bought-in goods and services are up to the required standard. With growing numbers of organizations seeking single sources of supply, this is extremely important as purchased items may account for up to 60 per cent of a manufacturing organization’s total costs[33].
  - *Quality training* – may include instruction in techniques and methods as well as internal and external auditing.
  - *Quality improvement programmes* – can include raising awareness of the workforce (at all levels) coupled with monitoring for signs of improvement.

(2) *Appraisal costs* are associated with the cost of evaluating the achievement of quality requirements. Appraisal costs may include:

- *Inspection and testing* – can take place at various planned stages in the operation. This usually involves working to stringent rules or plans and subsequently recording the results.
- *Laboratory acceptance testing* – where the batch or group of products may be tested before proceeding to the next stage in the operation and/or it may even involve statistical sampling and testing after packaging.
- *Analysis and reporting of test and inspection results* – is very important in order that any errors that have occurred are addressed in the future and that relevant personnel are made aware of problems.

The final cost category, however, tends to be the most important. Studies have shown that quality costs of 10-20 per cent of turnover are not uncommon and that 65 per cent of these costs can come from failure costs[34]. Failure costs can be divided into internal and external subcategories.

(3) *Internal failure costs* are regarded as the costs arising within an organization owing to nonconformities or defects at any stage of the process. These costs occur before despatch or delivery. Internal failure costs may include:

- *Scrap* – generally refers to product which is substandard and cannot be used.
- *Waste* – means the waste on a product which may arise from, for example, poor design, planning, or processes, and is over and above the process waste normally expected.
- *Rework and repair* – can occur at virtually any stage, particularly when there are multiple processes involved. Rework may mean a total re-manufacture, and repair may take place before the part or product moves on to the next stage.

(4) *External failure costs* may be crucial. These are the costs which arise after delivery to a customer/user and are due to nonconformities or defects. External failure costs may include:

- *Complaints* – which should be logged and investigated to prevent recurrence.
- *Warranty claims* – generally on products. High warranty claims can be indicative of poor product reliability and they can easily occur outside the original accounting period of manufacture. This is an added difficulty when determining the true cost of the products.

- *Concessions (deviations)* – occur when the goods or services are substandard and either the price is cut or credits are given to the customer.
- *Recall costs* – can be charged against the supplier and may include other charges as well as shipping costs.
- *Product liability* – is a growing area of concern and can involve complex legal issues.
- *Loss of sales* – may be attributable to one or more of the above. However, it may not be clear what caused the loss of sales and it can be very difficult to tie these losses to certain products.

Quality costs can also be regarded as:

- (1) The cost of conformance (COC), i.e. the cost of achieving the required standard or specification for the product or service supplied by the organization.
- (2) The cost of nonconformance (CONC) where specifications are not being met and failures occur at various points in the supply cycle.

This approach has been developed to apply quality costing to any process or service[23].

### The Role of the QA Professional

The quality assurance professional working in a TQM environment is therefore involved in a variety of activities which involve systems, people and techniques to achieve organizational objectives.

In attempting to establish a quality cost programme, a number of key areas have to be considered:

- (1) collecting quality cost data;
- (2) reporting quality costs;
- (3) the uses of quality cost data and information;
- (4) the difficulties with quality costs.

The purpose of the exercise may be to address, for example, high-cost problems, identify cost-reduction targets, determine performance measures, or some combination of these. The costing strategies employed can range from measuring and monitoring all identified quality costs to costing specific quality improvement projects and/or activities. At the same time, the issue of accountability has to be investigated and determined. It may be best to decide this from the outset of the exercise while planning the programme.

First, the quality costing strategy should recognize the importance of measurement and collection of quality-cost data. The management team should consider the following fundamental issues:

- (1) Why begin a programme?

- (2) Management resistance – what would/could this exercise reveal?

Generally speaking, a number of considerations arise in the collection of quality costs. These include:

- (1) The purpose of the programme should be made clear to those involved.
- (2) The relevance of the data which are going to be collected.
- (3) The ease of collection and determining whether improvements to present systems require too much disruption.
- (4) The size of the exercise. It is best to run a pilot study which allows for correction of procedures before going full-scale.

Quality costs can also be used as part of the strategic business plan. This obviously requires a reporting system, or mechanism, and should be designed to meet end-user needs, i.e. internal as well as external.

A number of difficulties arise in reporting quality costs and perhaps the key issue is what to report to the users of the information. Generally speaking, it is not easy to extract information from an existing system as accounting systems are not set up to give quality-cost information readily. In fact, at best, the systems already developed may be concerned only with inspection, failure and rework. It may be easier to begin afresh than to attempt to extract costs from the existing system. For approximately the last 15 years, quality assurance personnel in the USA have been urging accountants to become more involved so that quality-cost measurements could be incorporated into the accounting system and, at the same time, motivate management to take action[35]. However, regardless of the extent of the accountant's involvement, a number of fundamental reporting requirements should be considered, including:

- routine recording methods and mechanisms;
- deciding on the relevance of data;
- designing methods and formats which display graphical analysis in an understandable manner;
- account coding and classification which allows easy computer analysis;
- the promotion of the quality cost programme as a management control tool;
- finding ways of reporting information as part of the accounts reports.

Usefulness is one of the most important criteria, as there is little point in collecting data if the data are not going to be used. There are a number of ways in which the output from the programme can be used, e.g. promoting quality as a business measure internally, where

managers can be made aware of the key issues such as rework through regular management reports.

Improvements can be facilitated by using performance measures such as the profile of development costs and the nature of the costs such as waste. Furthermore, by establishing the system, the planning and control of future quality costs becomes possible; budgets can be monitored and reduction targets set.

### Problems with Quality Costs

The quality managers in both companies were experiencing difficulties related to quality costs. At the time of interview they were both actively working to overcome these. As well as dealing with quality costs, both managers are responsible for a number of key quality assurance areas which include maintaining the quality system, dealing with customer complaints and reporting to top management.

From the comments made during the interviews, when the managers were asked to identify ten main problems that they were experiencing, the quality-cost problems appear to fall into a small number of categories:

- management;
- QA/accountancy interface;
- communication;
- internal systems;
- people.

However, it is evident that the issues raised by the managers are somewhat more complex, and necessary changes would involve not only different attitudes, but also more investment in training and possibly changes in reporting throughout the organizations.

Company A is in the computer industry and is a market leader in one specialized field. Company B supplies intermediate, consumable products to the steel industry. The key points made by the quality managers are in the order given during the interviews and they are followed by commentary.

#### Company A

The quality manager has been working in quality assurance for more than ten years and he has a highly qualified, highly trained staff of six reporting to him. He is the senior quality assurance manager in the whole organization and there are no quality assurance professionals above him, i.e. at director level. He has qualifications in engineering as well as a higher degree and holds various certificates in quality assurance. For the last eight years he has been a member of the ASCQ, and a member of the IQA for the last seven years.

The company did not appear to care. They were making money – costs did not matter! For example, in production many cases were occurring of building/rework/rebuild. Not just components, but whole systems!

It is well documented that the computer industry has been experiencing serious problems owing to the worldwide recession and increased competition. In order to cut costs in some organizations, contracts with suppliers have been tightened up and large numbers of people have faced either early retirement or redundancy. Company A began to take the problems associated with quality costs more seriously at the end of 1991.

Costs were captured but not split into a cost of quality model. Therefore, no one was going after them and direct responsibility/ownership was lacking. The cost of quality tools could have been used to improve the situation, but these were not being used to potential. For example, Pareto analysis could be used to improve product quality but not the quality of the business!

Responsibilities for dealing with quality costs had not been agreed. The captured costs tended to be in a variety of formats with managers looking for different information. Managers could have been using Pareto analysis to highlight key problems in their own areas and this is now happening.

Cost of quality tools are being driven by the quality department.

The members of the quality assurance team were having to make decisions on which data to collect, ensure they were collected, analyse the data and prepare them in report format. To a large extent the exercise is still being driven by the quality assurance team.

QA have tried the theory, i.e. to “empower” production, but, given the choice between production and quality, then product “out the door” takes priority.

After identifying areas in production which needed to be addressed, the QA section expected the production management team, under a director, to ensure that recommended courses of action would be followed. This was not the case and it was apparent that the QA team would still have to become involved.

Communication – quality data are being “squeezed”, i.e. cut back from necessary report requirements and down to basics.

The quality assurance manager was aware that the section’s reports were being cut down to key points at senior management meetings. This meant that explanations of findings, and subsequent understanding by other managers, were not being communicated in a manner which would effect change and improvement.

Convincing accountants. For example, budget planning is six months rolling, volumes are not being met, but fixed costs are still there! Action – cut travel, cut training not addressing quality costs! “Short-termism”! Consider long-term effects, e.g. staff morale, errors, etc.

If the accountant is not fully convinced of the need to address the issues raised by quality-cost programmes, then, without his or her support, senior management may take no action. In this case the accountant was beginning to see what some of the problems were.

People are not measured on management of budgets – budgets can be blown, e.g. production manager does not have production targets as part of personal appraisal.

Budgets can have a powerful influence on how people behave[36] and, in the case of Company A, the quality manager felt that budgets should become part of the personal appraisal process.

Temporary labour leads to workmanship issues which can knock-on to rework, scrap and customer complaints, e.g. “dead on arrival” (DOA).

A pool of operators, trained by the company to a fair high standard, are used when work demands fluctuate and the permanent staff cannot cope. Because these workers are not there all the time, they inadvertently make mistakes and errors which cause problems. The solution may be to employ more people, spend more time and effort on training them, or extend despatch deadlines (this last option is unacceptable).

Reporting data. This is evolving and there is room for improvement. Too many managers want too much detail. Some do not. The manufacturing director spends 90 per cent of time on manufacturing and 10 per cent on quality-related issues.

The requirements of the management team regarding levels and quantity of information have not, as yet, been determined. One main problem lies with the level of detail which may, or may not, be available. It could take up considerable volume, if everything was reported. Determining appropriate levels of summary information is a key issue.

Changes/improvements can normally be achieved manually very quickly. If software is involved, it can take much longer. Why? It may not be seen as a priority. Shipping product takes priority. Anything else takes a back seat.

The manager felt that certain priorities were given to other activities outside quality assurance. In this case, this meant that delivery of the software he had hoped for, as an aid to control, was taking longer than expected.

#### **Company B**

The quality manager has been working in quality assurance for more than three years and he has a small team of quality technicians/assistants reporting to him. The company achieved BS 5750/ ISO 9002 Certification in 1989, and are at present bringing the design function into their standard to achieve ISO 9001. For the past two years he has been instrumental in planning and implementing a total quality management programme along with the other senior managers on the site. Areas they have addressed include a quality awareness programme and moving towards a single status site. He has qualifications

in engineering, holds various certificates in quality assurance, and is in the process of applying for membership of the IQA.

Getting an accurate cost for the simplest things, e.g. raw materials is easy. Added-value figures are very difficult.

Raw materials are costed and accounted for, but adding value to the product as it progresses through the various processes is extremely difficult. At present the quality manager is involved with others in determining added value.

Difficulty in classification (minor), e.g. is it internal or external failure, or a mixture of both?

Because of the complexity of the processes involved it is very difficult to determine exactly into which category a number of the costs fall. A solution to this problem may lie in apportioning the cost to both categories.

Rework measuring and costing, e.g. putting any cost to rework!

Partly because added value has not been determined, and partly because of the potential for rework, a major difficulty has arisen in that measuring and costing rework is a complex task and trying to cost rework involves allocating a cost to the product at the stage at which it has failed and adding the subsequent costs involved in rework.

Convincing people that measuring the cost of quality is important and a tool to be used. This could be beneficial to them, i.e. production, accounts, quality, etc.

The QA Manager has experienced difficulties in trying to convince other managers about the importance of quality costs and where they could benefit from them. The solution he currently employs is to communicate changes and significant figures to the management team with the object of stimulating involvement.

Allocating time to do it, i.e. the quality assurance manager is not getting time to drive the project.

Because of the demands on the manager, particularly in relation to the many aspects of quality improvement in which he is involved, he does not have the time available to implement the solutions to quality-cost problems.

Putting resources into the tasks (i.e. the QA manager) when he doesn't have the resources.

Resources have improved for the manager in that he has access to new technology and his quality technicians have new digital equipment to facilitate their work. However, the quality assurance manager does not, as yet, have the necessary staff to tackle some of the complex problems associated with quality costs.

Senior management commitment – verbal! Why? Time and other constraints and pressures are on them.

The QA manager feels that the commitment from senior managers could manifest itself in other ways than just verbally. However, he is very aware that they have many other things to contend with and he is attempting to solve



the problem by communicating findings to the senior managers on a regular basis.

Quality costs are seen as accounting and not quality improvement.

The quality cost programme is part of the TQM strategy of Company B. The QA Manager has experienced difficulties from certain quarters in that the exercise is not seen in the light of improving quality, but is regarded as an accounting function. This is a puzzle to the manager, given the difficulties in extracting information from the present accounting system, the complex cost-allocation problems in production, and the improvement achievements he has experienced to date.

Lack of enthusiasm, e.g. when the system was set up, people were not recording, i.e. it was not a priority for them.

It was evident that the QA manager's priorities were not necessarily the same as everyone else's on the site. After a certain amount of resistance, the data were recorded. However, it was necessary to explain the need and purpose of the collection exercise as well as monitoring the activity. Personnel are now more approachable and respond positively when information is requested.

A computer accounting system was not set up for easy access to figures which could be used for quality costs.

The accounting system used does not readily yield information in a useful format for the QA manager. Much of the information from the system is based on aggregate data and therefore does not pinpoint particular problem areas in the manufacturing process.

### Summary

From July 1950, in Japan, a quality chain reaction model was used by senior management, particularly in manufacturing, to bring the concept of quality improvement to all levels of employees[37]. The simple diagram used illustrates that, if you improve quality, costs will decrease and productivity will improve, ultimately leading to more jobs.

The two QA managers in the study openly communicate this concept in their attitudes as well as from their more tangible output. Both are professional in the way they are dealing with their respective situations. However, they cannot achieve quality objectives by themselves. This requires the involvement of people, robust systems, and understanding as well as commitment from senior managers.

It is evident that resources, particularly personnel, are scarce for both companies at present. To meet targets and solve problems, QA manager A has his staff deal with the more serious immediate problems which arise and, at the same time, areas are targeted for improvement. QA manager B is in the process of introducing new equipment which will assist his staff in reporting to him

and improve the efficiency of present laboratory testing methods.

Data from the systems employed are more readily available in Company A. However, the problem still exists in determining suitable and appropriate reporting formats. The QA manager in Company B has devised manual collection systems and, partly owing to the scarcity of his resources, he has concentrated on controlling and improving specific areas. In both companies it is apparent that the accounting systems do not readily yield information needed and, certainly in Company B, more rigorous definitions are necessary for costing procedures as process elements may be defined in ways which are difficult to cost accurately. Management accountants are slowly coming round to different concepts on costing[38], and it is essential that both QA managers have a good working relationship with their respective accountants[34].

The involvement of senior executives in a TQM programme is essential for the message they communicate to all staff, for their active support of the QA managers, and for their decision making which affects the use of scarce resources. No evidence was given which indicated that the QA managers were not being supported by senior colleagues. Commitment to TQM was being shown by senior managers but, from the comments, they were under other business pressures and did what they could.

Quality costs are only a part of a programme involving continuous improvement. Both quality assurance managers are experiencing difficulties, but both of them, in their own ways, are planning for improvement and laying the foundation for necessary changes. By addressing the problems uncovered from the quality cost exercises the companies have the potential not only to make great savings and put resources to better use, but also to achieve a healthier and stronger competitive position.

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