Chapter One

TQM: An Overview

B. G. Dale, A. van der Wiele and
J. D. van Iwaarden

Introduction

In today's global competitive marketplace the demands of customers are for ever increasing as they require improved quality of products and services. Also, in some markets there is an increasing supply of competitively priced products and services from low labour cost countries such as those in the Far East, the former Eastern bloc, China, Vietnam and India. Continuous improvement in total business activities with a focus on the customer throughout the entire organization and an emphasis on flexibility and quality is one of the main means by which companies face up to these competitive threats. This is why quality and its management and the associated continuous improvement are looked upon by many organizations as the means by which they can survive in increasingly aggressive markets and maintain a competitive edge over their rivals. The companies that do not manage this change will fail. As a result of the efforts made by organizations to respond to these marketplace demands the quality of products, services and processes has increased considerably during the last two decades. Feigenbaum and Feigenbaum (1999) point out that:

> Total Quality is a major factor in the business quality revolution that has proven itself to be one of the 20th century's most powerful creators of sales and revenue growth, genuinely good new jobs, and soundly based and sustainable business expansion.

Having said this, it should be pointed out that in many markets today quality, narrowly defined as the reliability of products and services, is not the competitive weapon it once was. It is now expected as a given requirement and is considered an entry-level characteristic to the marketplace.

These days, many organizations have had experiences with working on the transformation towards total quality management (TQM) and this is coupled with

its spread, from the manufacturing to the service sector and on to public services What is TQM? In simple terms, it is the mutual co-operation of everyone in an organization and associated business processes to produce value-for-money products and services which meet and, hopefully, exceed the needs and expectations of customers. TQM is an ever-evolving practice of doing business in a bid to develop methods and processes which cannot be imitated by competitors.

This chapter provides an overview of TQM and introduces the reader to the subject. Many of the themes outlined are explored later in the book. It opens by examining the different interpretations which are placed on the term 'quality'. It then examines why quality has grown in importance during the last decades. The evolution of quality management ('Co-ordinated activities to direct and control an organization with regard to quality': BS EN ISO 9000 (2000)) is described through the stages of inspection, quality control, quality assurance and onwards to TQM. In presenting the details of this evolution the drawbacks of a detection-based approach to quality are compared to the recommended approach of prevention. Having described these stages the chapter examines the key elements of TQM – commitment and leadership of the chief executive officer (CEO), planning and organization, using tools and techniques, education and training, employee involvement, teamwork, measurement and feedback, and culture change.

The chapter ends by presenting a summary of the points which organizations need to keep in mind when developing and advancing TQM. This is done under the broad groupings of organizing, systems and techniques, measurement and feedback, and changing the culture.

What is Quality?

'Quality' is now a familiar word. However, it has a variety of interpretations and uses, and there are many definitions. Today, and in a variety of situations, it is perhaps an over-used word. For example, when a case is being made for extra funding and resources, to prevent a reduction in funding, or to keep a unit in operation and in trying to emphasize excellence, just count the number of times the word 'quality' is used in the argument or presentation.

Many people say they know what is meant by quality, they typically claim 'I know it when I see it' (i.e. by sensing and/or instinct). This simple statement and the interpretations of quality made by lay people mask the need to define quality and its attributes in an operational manner. In fact, quality as a concept is quite difficult for many people to grasp and understand, and much confusion and myth surround it.

In a linguistic sense, quality originates from the Latin word 'qualis' which means 'such as the thing really is'. There is an international definition of quality, the

'degree to which a set of inherent characteristics fulfils requirements' (BS EN ISO 9000 (2000)). However, in today's business world there is no single accepted definition of quality. Irrespective of the context in which it is used, it is usually meant to distinguish one organization, event, product, service, process, person, result, action, or communication from another. For the word to have the desired effect as intended by the user and to prevent any form of misunderstanding in the communication, the following points need to be considered:

- The person using the word must have a clear and full understanding of its meaning.
- The people/audience to whom the communication is directed should have a similar understanding of quality to the person making the communication.
- Within an organization, to prevent confusion and ensure that everyone in each department and function is focused on the same objectives, there should be an agreed definition of quality. For example, Betz Dearborn Ltd. define quality as: 'That which gives complete customer satisfaction', and Rank Xerox (UK) as 'Providing our customers, internal and external, with products and services that fully satisfy their negotiated requirements'. North-West Water Ltd. use the term 'business quality' and define this as:
  - Understanding and then satisfying customer requirements in order to improve our business results.
  - Continuously improving our behaviour and attitudes as well as our processes, products and services.
  - Ensuring that a customer focus is visible in all that we do.

There are a number of ways or senses in which quality may be defined, some being broader than others but they all can be boiled down to either meeting requirements and specifications or satisfying and delighting the customer. These different definitions are now examined.

Qualitative

When the word quality is used in a qualitative way, it is usually in a non-technical situation. BS EN ISO 9000 (2000) says that 'the term "quality" can be used with adjectives such as poor, good or excellent'. The following are some examples of this:

- In advertising slogans to assist in building an image and persuade buyers that its production and services are the best: Esso – Quality at Work; Hayfield Textiles – Committed to Quality; Kenco – Superior Quality; Philips Whirlpool – Brings Quality to Life; Thompson Tour Operations – Thompson Quality Makes the World of Difference.

- By television and radio commentators (a quality player, a quality goal, a quality try).
- By directors and managers (quality performance, quality of communications).
- By people, in general (quality product, top quality, high quality, original quality, quality time, quality of communications, quality person, loss of quality, German quality, 100 per cent quality).

It is frequently found that in such cases of 'quality speak' the context in which the word quality is used is highly subjective and in its strictest sense is being misused. For example, there is more than one high street shop which trades under the name of 'Quality Seconds', and some even advertise under the banner of 'Top Quality Seconds'. There is even a company with the advertising slogan 'Quality Part-Worn Tyres' on the side of its vans.

Quantitative

The traditional quantitative term which is still used in some situations is acceptable quality level (AQL). This is defined in BS 4778 (1991) as: 'When a continuing series of lots is considered, a quality level which for the purposes of sampling inspection is the limit of a satisfactory process'. This is when quality is paradoxically defined in terms of non-conforming parts per hundred (i.e. some defined degree of imperfection).

An AQL is often imposed by a customer on its supplier in relation to a particular contract. In this type of situation the customer will inspect the incoming batch according to the appropriate sampling scheme. If more than the allowed number of defects are found in the sample the entire batch is returned to the supplier or the supplier can, at the request of the customer, sort out the conforming from non-conforming product on the customer's site. The employment of an AQL is also used by some companies under the mistaken belief that trying to eliminate all defects is too costly.

The setting of an AQL by a company can work against a 'right first time' mentality in its people as it appears to condone the production and delivery of non-conforming parts or services, suggesting that errors are acceptable to the organization. It is tantamount to planning for failure. For example, take a final product which is made up of 3,000 parts: if the standard set is a 1 per cent AQL, this would mean that the product is planned to contain 30 non-conforming parts. In reality there are likely to be many more because of the vagaries of the sampling used in the plan or scheme, whereby acceptance or rejection of the batch of product is decided.

Another example of a quantitative measure is to measure processes using sigmas (a sigma is a statistical indication of variation) and defects per million opportunities (DPMO). A sigma is essentially a measuring device that is an indication

Table 1.1 Levels of service performance requirements

Comparative measure	*Grade*	*Billing queries: % answered within 5 days*	*Written complaints: % answered within 10 days*	*Billing metered customers: % read minus % unread*
Well above average	A	>95	>98	>99.4
Above average	B	92–95	96–98	98.5–99.4
Average	C	89–92	94–96	96.0–98.4
Below average	D	86–89	92–94	93.0–95.9
Well below average	E	<86	<92	<93.0

Source: Office of Water Services (OFWAT) (1995/6).

of how good a product or service is. The higher the sigma value the lower the number of defects. For example, 3 sigma equals 66,807 DPMO, while 6 sigma equals 3.4 DPMO (these values assume a normal distribution with a process shift of 1.5 sigma). The sigma level is a means of calibrating performance in relation to customer needs.

The concept of six sigma (a quality improvement framework) has developed from its origins in Motorola in the 1980s as an approach to improving productivity and quality and reducing costs. Six sigma is the pursuit of perfection and represents a complete way of tackling process improvement from a quantitative approach, involving many of the concepts, systems, tools and techniques described in this book. The six sigma concept is currently very popular as a business improvement approach. The key features include a significant training commitment in statistics and statistical tools, problem-solving methodology and framework, project management, a team-based project environment, people who can successfully carry out improvement projects (these are known as black belts and green belts, based on the martial arts hierarchy), leaders (master black belts) and project champions.

Yet another example of a quantitative measure of quality are levels of service performance requirements; see the data in table 1.1.

Uniformity of the product characteristics or delivery of a service around a nominal or target value

If product or service dimensions are within the design specification or tolerance limits they are considered acceptable; conversely, if they are outside the specification they are not acceptable (see figure 1.1). The difference between what is considered to be just inside or just outside the specification is marginal. It may also be questioned whether this step change between pass and fail has any scientific basis and validity.

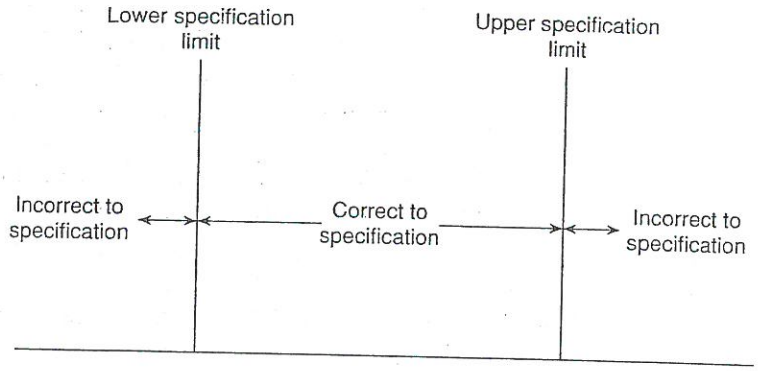

Figure 1.1 The inside/outside specification dilemma

Designers often establish specification limits without sufficient knowledge of the process by which the product and/or service is to be produced/delivered and its capability. It is often the case that designers cannot agree amongst themselves about the tolerances/specification to be allocated, and it is not uncommon to find outdated reasoning being used. They also tend to define and establish a tighter tolerance than is justified to provide safeguards and protect themselves. In many situations there is inadequate communication on this matter between the design and operation functions. Fortunately, this is changing with the increasing use of simultaneous or concurrent engineering.

The problem with working to the specification limits in a manufacturing situation is that it frequently leads to tolerance stack-up and parts not fitting together correctly at the assembly stage. This is especially the case when one part which is just inside the lower specification limit is assembled to one which is just inside the upper specification. If the process is controlled such that a part is produced around the nominal or a target dimension with limited variation (see figure 1.2), this problem does not occur and the correctness of fit and smooth operation of the final assembly and/or end product are enhanced.

The idea of reducing the variation of part characteristics and process parameters so that they are centred around a target value can be attributed to Taguchi (1986). He writes that the quality of a product is the (minimum) loss imparted by the product to the society from the time the product is shipped. This is defined by a quadratic loss curve. Among the losses he includes time and money spent by customers, consumers' dissatisfaction, warranty costs, repair costs, wasted natural resources, loss of reputation and, ultimately, loss of market share.

The relationship of design specification and variation of the process can be quantified by a capability index, for example, Cp which is a process potential capability index:

$$Cp = \frac{\text{Total specification width}}{\text{Process variation width}}$$

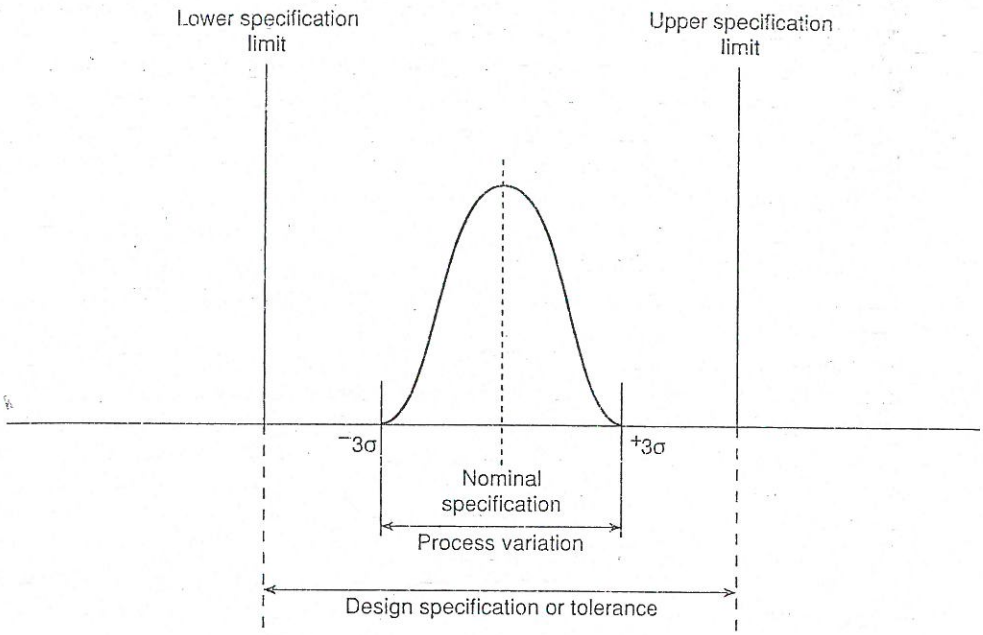

Figure 1.2 Design tolerance and process variation relationship

Conformance to agreed and fully understood requirements

This definition is attributed to Crosby (1979). He believed that quality is not comparative and that there is no such thing as high quality or low quality, or quality in terms of goodness, feel, excellence and luxury. A product or service either conforms to requirements or it does not. In other words, quality is an attribute (a characteristic which, by comparison to a standard or reference point, is judged to be correct or incorrect) not a variable (a characteristic which is measurable). Crosby made the point that the requirements are all the actions required to produce a product and/or deliver a service that meets the customer's expectations, and that it is management's responsibility to ensure that adequate requirements are created and specified within the organization.

This is a useful definition to use in the development of service-level agreements (SLAs). Some products and services are highly sophisticated in terms of their design but are poor in terms of conformance to requirements. On the other hand, some are simple in terms of their design but exhibit high levels of conformance to requirements. The 'quality of design' (the degree to which the design of the product and/or service achieves its purpose) can be confused with the 'quality of conformance' (how well the product and/or service conforms to the design). Stemming from this confusion about design and conformance there can be a tendency to believe that 'better' quality means higher costs. This view results

from the confusion between quality and grade. Grade represents the addition of features and characteristics to satisfy the additional needs of customers and this clearly requires extra monies, but grade is different to quality.

Fitness for purpose/use

This is a standard definition of quality first used by Juran (Juran 1988, Juran and Godfrey 1999). Juran classifies 'fitness for purpose/use' into the categories of: quality of design, quality of conformance, abilities and field service. Focusing on fitness for use helps to prevent the over-specification of products and services. Over-specification can add greatly to costs and tends to militate against a right-first-time performance. How fit a product or service is for use obviously has to be judged by the purchaser, customer or user.

Satisfying customer expectations and understanding their needs and future requirements

A typical definition which reflects this aim is: 'The attributes of a product and/or service which, as perceived by the customer, makes the product/service attractive to them and gives them satisfaction.' The focus of the definition is adding value to the product and/or service.

Satisfying customers and creating customer enthusiasm through understanding their needs and future requirements is the crux of TQM, and all organizations are dependent on having satisfied customers. TQM is all about customer orientation and many company missions are based entirely on satisfying customer perceptions. Customer requirements for quality are becoming stricter and more numerous, and there are increasing levels of intolerance of poor-quality goods and services and low levels of customer service and care. The customer is the major reason for an organization's existence and customer loyalty and retention is perhaps the only measure of organizational success. In most situations customers have a choice: they need not place future orders with a supplier who does not perform as they expected or who they feel has deceived them. They will certainly not jeopardize their own business interest out of loyalty to a supplier whose products and service fail to perform properly, and will simply go to a competitor. In the public sector the customer may not have the choice to go elsewhere; however, they can go to litigation, write letters of complaint, cause disruption, and use elections to vote officials out of office. The aim of superior-performing companies is to become the supplier of choice to their customers and to 'lock' themselves into their customers' mode of operation by becoming their sole supplier, and by adding value to their customers' businesses by process improvement and cost-down activities. A number of countries have developed a customer

satisfaction index. The American index (see <www.theacsi.org>), for example, indicates satisfaction with the quality of goods and services in numerous industries.

The superior-performing organizations go beyond satisfying their customers: they emphasize the need to delight them by giving them more than what is required in the contract; they also talk about winning customers and becoming infatuated with their customers. These organizations create a total experience for their customers, which is unique in relation to the offerings of competitors (which is called 'the experience economy', see Pine and Gilmore (1999)). The wisdom of this can be clearly understood when we consider the situation where a supplier has given more than the customer expected (e.g. an extra glass of wine on an aircraft; a sales assistant going out of their way to be courteous and helpful and providing very detailed information) and the warm feelings generated by this type of action.

A customer-focused organization also puts considerable effort into anticipating the future expectations of its customers (i.e. surprising quality), and, by working with them in long-term relationships, helps them to define their future needs and expectations. They listen very closely to their customers and 'real' users of the product or service, in order to gain a clearer perspective on customer experiences. They aim to build quality into the product, service, system and/or process as upstream as is practicable. Excitement and loyalty are the words used to describe this situation.

Those companies intent on satisfying customer needs and expectations will have in place a mechanism for facilitating a continuous two-way flow of information between themselves and their customers. There are a variety of means available to companies for them to assess issues such as:

- How well they are meeting customer expectations
- How well the brand is respected
- What customers' chief causes of concern are
- What the main complaints are
- What suggestions for improvements customers might have
- How they might add value to the product and/or service
- How well they act on what the customer says
- The best means of differentiating themselves in the marketplace

The trend is for increasing the level of contact with the customer. These 'moments of truth' (Carlzon 1987) occur far more frequently in commerce, public organizations, the Civil Service and service-type situations than in manufacturing organizations. The means for increasing the level of customer contact include:

- Customer workshops
- Panels and clinics
- Using 'test' consumers and mystery shoppers

- Focus groups
- Customer interviews
- Market research
- Dealer information
- Questionnaire surveys
- Product reports
- Trailing the service and/or product
- Trade shows

Customer complaints are one indication of customer satisfaction, and many organizations have a number of metrics measuring such complaints. BS 8600 (1999) provides guidance on how to develop an effective complaints management system in order to analyse and use complaints effectively. The rationale is that managing complaints in a positive manner can enhance customer perceptions of an organization, increase lifetime sales and values and provide valuable market intelligence.

Having listened to 'customer voices' an organization should put in place appropriate strategy and actions for making the necessary changes and improvements. It is also important to clarify and identify the elements and characteristics of the product and service which the customer finds attractive. The service quality questionnaire (SERVQUAL) developed by Parasuraman et al. (1988) may be used to track these kinds of issues. This customer-required quality (i.e. their wants) should be translated into the language of internal needs and driven back through all levels in the organizational hierarchy. It is important that the requirements are put into terms that are measurable, realistic and achievable; the use of quality function deployment (QFD) is useful in this respect (for a detailed discussion of QFD, see chapter 17). Customer needs and requirements are for ever changing, and organizations have to live up to their customers' expectations; they are never satisfied, even though the supplying organization may think they are.

Why is Quality Important?

To answer this question, just consider the unsatisfactory examples of product and/or quality service that you, the reader, have experienced, the bad feelings it gave, the resulting actions taken and the people you told about the experience and the outcome. Goodman et al. (2000), based on a range of studies carried out by TARP (Technical Assistance Research Programs), outline two arguments that are effective in selling quality to senior management.

- First, quality and service improvements can be directly and logically linked to enhanced revenue within one's own company; and secondly, higher quality allows companies to obtain higher margins.

The following extracts some quantitative evidence in relation to these arguments:

- 'Problems decrease customer loyalty by 15 per cent to 30 per cent'
- '50 per cent of individual consumers and 25 per cent of business customers who have problems never complain to anyone at the company'
- 'If the call centre can resolve a customer's problem using quality service, thus changing a dissatisfied customer to a satisfied one, the company usually gets an increase in loyalty of 50 percentage points'
- 'One potential customer will be lost for every 50 who hear someone complain about a product or service'
- 'Market leaders can charge between 5 per cent and 10 per cent premiums for outstanding quality and service'

The customer service information in box 1.1 provides additional quantitative facts about this. These data emphasize the importance of customer acquisition and retention.

BOX 1.1 CUSTOMER SERVICE FACTS

Customer Service Facts: Did You Know That* . . .

1 If 20 customers are dissatisfied with your service, 19 won't tell you. 14 of the 20 will take their business elsewhere.
2 Dissatisfied customers tell an average of 10 other people about their bad experience; 12 per cent tell up to 20 people.
3 Satisfied customers will tell an average of 5 people about their positive experience.
4 It costs five times more money to attract a new customer than to keep an existing one.
5 Up to 90 per cent of dissatisfied customers will not buy from you again, and they won't tell you why.
6 In many industries, quality of service is one of the few variables that can distinguish a business from its competition.
7 Providing high-quality service can save your business money. The same skills that lead to increased customer satisfaction also lead to increased employee productivity.
8 Customers are willing to pay more to receive better service.
9 95 per cent of dissatisfied customers will become loyal customers again if their complaints are handled well and quickly.

* *Statistics compiled by Mattson & Associates from service sector companies in the USA.*

Source: CMC Partnership Ltd. (1991).

The following are examples of survey data which have focused on the perceived importance of product and service quality.

Public perceptions of product and service quality

In 1988 the American Society for Quality (ASQ) commissioned the Gallup organization to survey public perceptions on a variety of quality-related issues. This survey was the fourth in a series which began in 1985; the 1985 and 1988 surveys focused on US consumers and the 1986 and 1987 studies surveyed attitudes of company executives. The 1988 study was done by conducting telephone interviews with 1,005 adults in the United States during the summer of 1988. A selection of results, as reported by Ryan (1988) and Hutchens (1989), is outlined below:

- The following is a ranking of factors that people consider important when they purchase a product:
  - Performance
  - Durability
  - Ease of repair, service availability, warranty, and ease of use (these four factors were ranked about the same)
  - Price
  - Appearance
  - Brand name
- People will pay a premium to get what they perceive to be higher quality.
- Consumers are willing to pay substantially more for better intrinsic quality in a product.
- According to the respondents, the following are the factors what make for 'higher' quality in services:
  - Courtesy
  - Promptness
  - A basic sense that one's needs are being satisfied
  - Attitudes of the service provider
- When consumers do experience a problem with the product, they appear reluctant to take positive action with the manufacturer. The 1987 survey revealed that executives regard customer complaints, suggestions and enquiries as key indicators of product and service quality.

An ASQ/Gallup survey (ASQ/Gallup 1991) was conducted to survey the attitudes and opinions of consumers in Japan, West Germany and the United States in relation to questions such as: 'What does quality really mean to them? How do they define it and does it influence their buying behaviour? What is

their perception of the quality from other parts of the world? and What are the dynamics underlying a consumer's reasons for buying or not buying something produced in a foreign country?' On a number of issues, this survey updates American attitudes expressed in the 1988 survey. Over 1,000 people in each country were questioned. A selection of summary highlights from the report are outlined below:

- 'Consumers in the US, Japan and West Germany in many respects are alike in terms of the attributes they consider important in determining the quality of the products they buy. For example, approximately one in five look to the brand name of a product. Durability is also important to at least 10 per cent of the consumers in each of the countries surveyed.'
- 'Asked what factors are most important in influencing their decision to buy a product, price is the leading response in West Germany (64 per cent) and in the US (31 per cent). Performance (40 per cent) is most important among Japanese consumers, followed by price (36 per cent).'
- 'A majority (61 per cent) of US consumers believe it is very important to US workers to produce high-quality products or service.'
- 'Price and quality are the reasons given most frequently by American consumers for buying a product made in Japan or Germany.'

Views and roles of senior management

1 In 1992 ASQ commissioned the Gallup organization to study the nature of leadership for quality within American business organizations by surveying opinions of senior management in both large and small organizations. The objective was to explore their views concerning quality improvement and the role of directors with regard to quality. Some 684 executives were interviewed. The following is a summary of the main findings extracted from ASQ/ Gallup (1992).
   - 'At least six in ten executives report that they have a great deal of personal leadership impact on customer focus and satisfaction, strategic quality planning, quality and operational results and financial results.'
   - 'Most executives believe management plays a greater role than the board in determining quality policy within their company.'
   - 'More than four in ten (45 per cent) report their board does discuss quality frequently.'
   - 'Four in ten (43 per cent) executives report their board reports on consumer satisfaction frequently, and almost as many (38 per cent) report the board reviews reports on customer retention or loyalty frequently.'
2 The European Foundation for Quality Management (EFQM) contracted McKinsey and Company to survey the CEOs of the top 500 west European

corporations in relation to quality performance and the management of quality; 150 CEOs responded to the survey. The following are some of the main findings as reported by McKinsey and Company (1989).

- Over 90 per cent of CEOs consider quality performance to be 'critical' for their corporation.
- 60 per cent of CEOs said that quality performance had become a lot more important than before (late 1970s).
- The four main reasons why quality is perceived to be important are:
  - Primary buying argument for the ultimate customer
  - Major means of reducing costs
  - Major means for improving flexibility/responsiveness
  - Major means for reducing throughput time.
- The feasible improvement in gross margin on sales through improved quality performance was rated at an average of 17 per cent.
- More than 85 per cent of the leading CEOs in Europe consider the management of quality to be one of the top priorities for their corporations.

3 Lascelles and Dale (1990), reporting on a survey they carried out of 74 UK CEOs, say that 'Almost all the respondents believe that product and service quality is an important factor in international competitiveness. More than half have come to this conclusion within the past four years.'

4 Ahire and O'Shaughnessy (1998) conducted a large-scale survey of quality management practices at suppliers in the automotive industry, looking at such practices as top management commitment, customer focus, supplier quality management, design quality management, benchmarking, statistical process control, internal quality information usage, employee training, employee empowerment, employee involvement, and product quality. They conclude that:

- 'Firms with high top management commitment implement the other nine TQM implementation elements more rigorously than those with low top management commitment.'
- 'In firms with high top management commitment, variations among the other nine TQM implementation constructs do not affect product quality significantly.'
- 'In firms with low top management commitment, four of the nine implementation constructs, namely, customer focus, empowerment, internal quality information usage, and supplier quality management are primary predictors of quality.'

Quality is not negotiable

An order, contract or customer which is lost on the grounds of non-conforming product and/or service quality is much harder to regain than one lost on price

or delivery terms. In a number of cases the customer could be lost for ever; in simple terms the organization has been outsold by the competition.

If you have any doubt about the truth of this statement just consider the number of organizations that have gone out of business or lost a significant share of a market, and consider the reported reasons for them getting into that position. Quality is one of the factors which is not negotiable and in today's business world the penalties for unsatisfactory product quality and poor service are likely to be punitive.

Quality is all-pervasive

There are a number of single-focus business initiatives which an organization may deploy to increase profit. However, with the improvements made by companies in their mode of operation, reduction in monopolies, government legislation, deregulation, changes in market share, mergers, takeovers, collaborative joint ventures, there is less distinction between companies than there was some years ago. TQM is a much broader concept than previous initiatives, encompassing not only product, service and process improvements but those relating to costs and productivity and to people involvement and development. It also has the added advantage that it is totally focused on satisfying customer needs.

A related issue is that organizations are often willing to pay more for what they perceive as a quality product; see the results of the ASQ/Gallup survey of 1992, as outlined in table 1.2.

Quality increases productivity

Cost, productivity and quality improvements are complementary and not alternative objectives. Managers sometimes say that they do not have the time and

Table 1.2 Customers willing to pay for quality

Industry type	*Number of customers willing to pay more for a quality product*	*Number of customers unwilling to pay extra for better quality*
Clothing/textiles	135	5
Furniture	74	4
TV/audio	66	6
Home	55	4
Automotive	36	10

Source: ASQ/Gallup (1992)

resources to ensure that product and/or service quality is done right the first time. They go on to argue that if their people concentrate on planning for quality then they will be losing valuable operational time, and as a consequence output will be lost and costs will rise. Despite this argument, management and their staff will make the time to rework the product and service a second or even a third time, and spend considerable time and organizational resources on corrective action and placating customers who have been affected by the non-conformances.

Remember 'Murphy's Law' – 'There is never time to do it right but always time to do it once more.'

Quality leads to better performance in the marketplace

The Profit Impact of Market Strategy (PIMS), conducted under the Strategic Planning Institute in Cambridge, Massachusetts, have a database which contains records of detailed business performance of over 3,000 business units. The Institute is a co-operative run by its members. The database allows a detailed analysis of the parameters which influence business performance. A key PIMS concept is relative perceived quality (RPQ); this is the product and service offering as perceived by the customer. PIMS data are often used to model options before adapting a change initiative and to assess how improvements translate into improved profits and enhanced customer loyalty. It has been established that the factors having most leverage on return on investment are RPQ and relative market share, and that companies with large market shares are those whose quality is relatively high, whereas companies with small market shares are those whose quality is relatively low (see Buzzell and Gale 1987). Another key finding is that businesses who know and understand customers' priorities for quality improvements can achieve a threefold increase in profitability (Roberts 1996).

Quality means improved business performance

Kano et al. (1983) carried out an examination of 26 companies which won the Deming Application Prize (this is a prize awarded to companies for their effective implementation of company-wide quality control; for details see chapter 25). Between 1961 and 1980 they found that the financial performance of these companies in terms of earning rate, productivity, growth rate, liquidity, and net worth was above the average for their industries.

A report published by the US General Accounting Office (GAO) (1991) focused on the top 20 scorers of the Malcolm Baldrige National Quality Award (MBNQA) in the period 1988–9. Its purpose was to determine the importance of TQM practices on the performance of US companies. Using a combination

of questionnaire and interview methods, the companies were asked to provide information on four broad classes of 20 performance measures – employee-related indicators, operating indicators, customer satisfaction indicators and business performance indicators. Improvements were claimed in all these indicators (e.g. market share, sales per employee, return on assets, and return on sales). Useful information on financial performance was obtained from 15 of the 20 companies who experienced the following annual average increases:

- Market share: 13.7 per cent
- Sales per employee: 8.6 per cent
- Return on assets: 1.3 per cent
- Return on sales: 0.4 per cent

Larry (1993) reports on a study carried out on the winners of the MBNQA and found that they 'Yielded a cumulative 89 per cent gain, whereas the same investment in the Standard and Poor (S&P) 500 – Stock Index delivered only 33.1 per cent.' Wisner and Eakins (1994) also carried out an operation and financial review of the MBNQA winners from 1988 to 1993. One of the conclusions reached was that the winners appear to be performing financially as well as or better than their competitors.

As reported by Bergquist and Ramsing (1999), Bergquist carried out a study in 1996, entitled 'An Assessment of the Operational and Financial Impact on Companies of Quality Awards in the United States', which used the same approach as the 1991 GAO study, expanding to 40 the original 20 performance measures. The focus of the study was a questionnaire survey of winners and applicants of MBNQA and State Quality Awards, between the years 1990 and 1995. They conclude:

> 89 per cent of the winners and 77 per cent of the applicants who responded to the mail survey believed that using award criteria did have a positive impact on company performance, a link appears to exist between award criteria and perceived company performance.

The Bradford study (Letza et al. 1997), carried out at the University of Bradford Management Centre, identified 29 companies within the UK which display characteristics associated with TQM. Following the US GAO work the study was first carried out over the period 1987 to 1991 and has been repeated for the period 1991 to 1995. Nine measures have been used by the study team to compare company performance with the median for the particular industry. The second study reveals the following:

- 81 per cent of companies are above the industry median for turnover per employee.

- 81 per cent of the companies provide a higher salary to turnover ratio than their peers.
- 74 per cent of the organizations remunerate their employees above the median for the industry.
- 65 per cent of the organizations produce above-median profit per employee for their industry.
- 62 per cent of the organizations have a higher net asset turnover than their peer group.

The authors also go on to say that 'Four of the nine measures are marginally below the median for their industry but this is to be expected as quality becomes institutionalized and more widespread.'

Easton and Jarrell (1998) have undertaken an extremely thorough study which has examined the impact of TQM on financial performance for a sample of 108 firms. The impact of TQM has been assessed by examining the unexpected changes in financial performance for a five-year period following the introduction of TQM. Easton and Jarrell (1998) conclude that 'The findings indicate that performance, measured by both accounting variables and stock returns, is improved for the firms adopting TQM. The improvement is consistently stronger for firms with more advanced TQM.'

Another very thorough study is that undertaken by Hendricks and Singhal (1996) in America, which began in 1991. They have measured the effects of TQM on long-term business performance. The study sample comprised nearly 600 award-winners (e.g. MBNQA, State Quality Awards and Supplier Awards) and compared their performance with that of similar companies that had not won such an award. The study found that it required a long time period to establish the link between TQM and financial performance because of its evolutionary nature. For the implementation period which started six years before a company won an award, they found no difference between award-winners and non-award-winners. The following are some of the key results from the post-implementation period:

- Winners experienced a 91 per cent increase in operating income compared with their respective controls (43 per cent).
- Winners gained a 69 per cent increase in sales compared with their controls (32 per cent) and attained a 79 per cent increase in total assets compared with the respective controls (37 per cent).
- Winners increased their employees by 23 per cent compared with their respective controls (7 per cent).
- Over the five-year study period the award-winners outperformed the S&P 500 index by 34 per cent.

In the *X Factor Report* (British Quality Foundation 1999) the award submissions from 14 European and UK quality/business excellence award-winning

companies were analysed regarding financial performance. The results were examined for (1) three-year trends and sustained good performance; (2) five-year trends and sustained excellent performance; and (3) favourable comparisons with set targets. Strong positive trends and/or sustained excellent performance over three years were demonstrated by over 70 per cent of the companies using three main financial measures:

- Revenue growth
- Operating profit
- Return on assets

Other financial measures against which these role-model companies performed well over three and five years and against targets/benchmarks, included:

- Cashflow
- Liquidity
- Debtor days
- Shareholder funds

George (2002) reports on the Q-100 index, which was established in 1998. This is based on investments in American-based organizations which are using TQM. The search for such companies is undertaken by the Malcolm Baldrige National Quality Award criteria. The Q-100 consists of approximately 100 of the 500 S&P companies, which are weighted and diversified to align them with the weightings and sectors in the S&P 500. Among the findings reported by George (2002) are:

> From September 30th, 1998 to December 31st, 2001 the Q-100 returned 26.97 per cent compared with the S and P 500 return of 17.59 per cent.
>
> A $10,000 investment in both indices on September 30th, 1998 would have grown to $12,697 for the Q-100 on the last day of 2001, compared with $11,759 for the S and P 500.

Perhaps the best-known quality/financial metric is the 'Baldrige Index'. This is a fictitious stock fund made up of publicly traded US companies that have received the MBNQA during the years 1993 to 2002. The US Commerce Department's National Institute of Technology (NIST) invested a hypothetical $1,000 in each of the whole company winners and the parent companies of 18 subsidiary winners. They also made the same investment in the S&P 500 index at the same time. The investments have been tracked from the first business day of the month following the announcement of the award receipts through to 1 December 2003. NIST (2006) reported that the award winners outperformed the S&P 500 by more than 6.5 to 1, until December 2001. The two following years of the study showed that the Baldrige Index underperformed the S&P 500.

The cost of non-quality is high

Based on a variety of companies, industries and situations, the cost of quality (or to be more precise the cost of not getting it right the first time) ranges from 5 to 25 per cent of an organization's annual sales turnover in manufacturing or annual operating costs in service-type situations; see chapter 9 and Dale and Plunkett (1999) for details. An organization should compare its profit-to-sales turnover ratio to that of its quality costs-to-sales turnover ratio in order to gain an indication of the importance of product and service quality to corporate profitability. A study by Halevy and Naveh (2000), found that some 30 per cent of Israel's national product 'is wasted due to poor quality of planning and workmanship'.

A related cost issue is that of product liability, which is concerned with the legal liability of a manufacturer or supplier of goods for personal injuries or damage to property suffered as a result of a product which is defective and unsafe; see European Commission Directive (1985). A powerful example of the cost and implications of the failure to get a product right is provided by Wilks (1999):

> In July this year General Motors was fined a record $4.9 billion following a crash in 1993 which seriously burned six people involved in a rear end car collision. The severity of their injuries – some suffered 60 per cent burns – was put down to design fault in placing the petrol tank too close to the rear bumper. The victims' lawyers discovered that an internal GM study had highlighted this danger and that the manufacturer had known 'for years' that this model was potentially unsafe. To alter the design would have cost the company $8.59 per car.

Customer is king

In today's markets, customer requirements are becoming increasingly more rigorous and their expectations of the product and/or service in terms of conformance, reliability, dependability, durability, interchangeability, performance, features, appearance, serviceability, user-friendliness, safety, and environmental friendliness is also increasing. These days many superior-performing companies talk in terms of being 'customer-obsessed'. At the same time, it is likely that the competition will also be improving and, in addition, new and low-cost competitors may emerge in the marketplace. Consequently there is a need for continuous improvement in all operations of a business, involving everyone in the company. The organization which claims that it has achieved TQM will be overtaken by the competition. Once the process of continuous improvement has been halted, under the mistaken belief that TQM has been achieved, it is much harder to restart and gain the initiative on the competition, (see figure 1.3). This is why TQM should always be referred to as a process and not a programme.

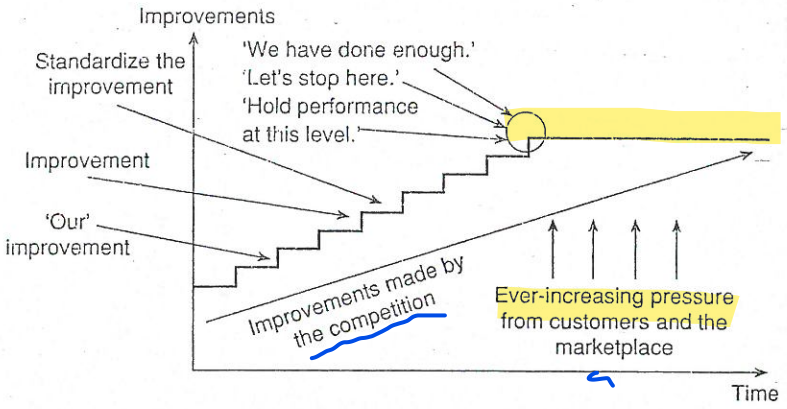

Figure 1.3 Quality improvement: a continuous process

Quality is a way of life

Quality is a way of organizational and everyday life. It is a way of doing business, living and conducting one's personal affairs. In whatever each person does, and in whatever situation, the task(s) must be undertaken in a quality-conscious way. Quality is driven by a person's own internal mechanisms – 'heart and soul', 'personal beliefs'. Belief in it can be likened to that of people who follow a religious faith. Companies like Toyota emphasize strongly the need for the commitment of all employees to managing and improving quality, which is an essential part of the famous Toyota Production System (Liker 2003).

An organization committed to quality needs quality of working life of its people in terms of participation, involvement and development and quality of its systems, processes and products.

The Evolution of Quality Management

Systems for improving and managing quality have evolved rapidly in recent years. During the last two decades or so simple inspection activities have been replaced or supplemented by quality control, quality assurance has been developed and refined, and now many companies, using a process of continuous and company-wide improvement, are working towards TQM. In this progression, four fairly discrete stages can be identified: inspection, quality control, quality assurance and total quality management; it should be noted that the terms are used here to indicate levels in a hierarchical progression of quality management (figure 1.4). British and International Standards definitions of these terms are given to

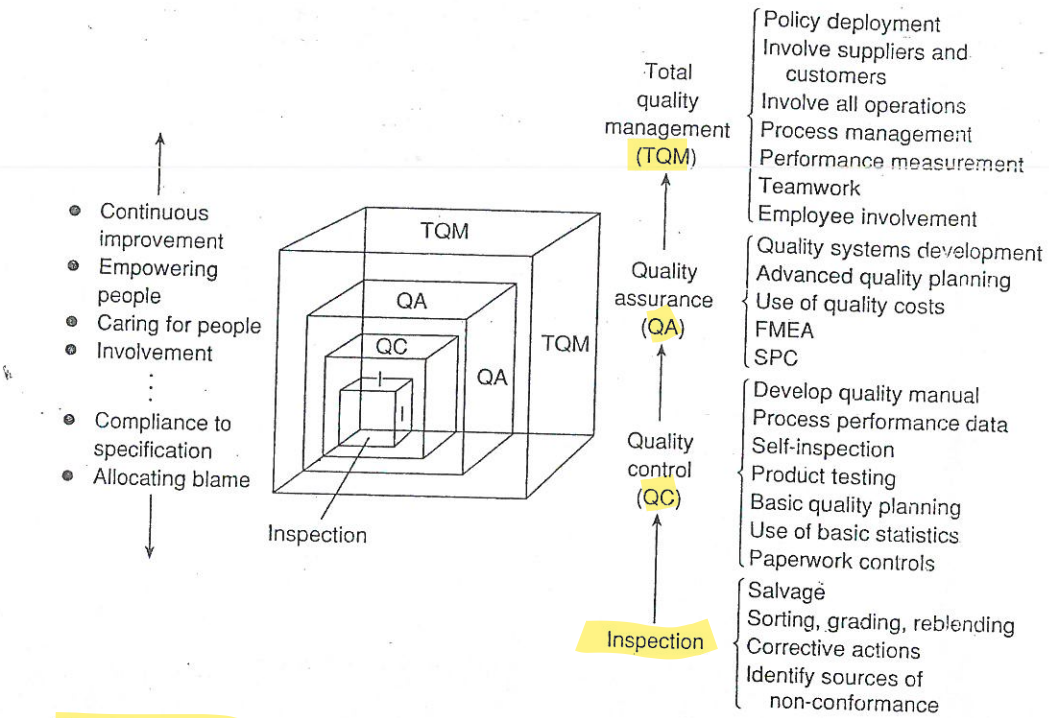

Figure 1.4 The four levels in the evolution of TQM

provide the reader with some understanding, but the discussion and examination are not restricted by these definitions.

Inspection

Conformity evaluation by observation and judgement accompanied as appropriate by measurement, testing or gauging. (BS EN ISO 9000 (2000))

At one time inspection was thought to be the only way of ensuring quality, the 'degree to which a set of inherent characteristics fulfils requirements' (BS EN ISO 9000 (2000)). Under a simple inspection-based system, one or more characteristics of a product, service or activity are examined, measured, tested, or assessed and compared with specified requirements to assess conformity with a specification or performance standard. In a manufacturing environment the system is applied to incoming goods and materials, manufactured components and assemblies at appropriate points in the process and before finished goods are passed into the warehouse. In service, commercial and public service-type situations the system is also applied at key points, sometimes called appraisal points, in the production and delivery processes. The inspection activity is, in the main, carried

out by dedicated staff employed specifically for the purpose, or by self-inspection of those responsible for a process. Materials, components, paperwork, forms, products and goods which do not conform to specification may be scrapped, reworked, modified or passed on concession. In some cases inspection is used to grade the finished product as, for example, in the production of cultured pearls. The system is an after-the-event screening process with no prevention content other than, perhaps, identification of suppliers, operations, or workers, who are producing non-conforming products/services. There is an emphasis on reactive quick-fix corrective actions and the thinking is department-based. Simple inspection-based systems are usually wholly in-house and do not directly involve suppliers or customers in any integrated way.

Quality control

> Part of quality management focused on fulfilling quality requirements. (BS EN ISO 9000 (2000))

Under a system of quality control one might expect, for example, to find in place detailed product and performance specifications, a paperwork and procedures control system, raw material and intermediate-stage product-testing and reporting activities, logging of elementary process performance data, and feedback of process information to appropriate personnel and suppliers. With quality control there will have been some development from the basic inspection activity in terms of sophistication of methods and systems, self-inspection by approved operators, use of information and the tools and techniques which are employed. While the main mechanism for preventing off-specification products and services from being delivered to customers is screening inspection, quality control measures lead to greater process control and a lower incidence of non-conformance.

Those organizations whose approach to the management of quality is based on inspection and quality control are operating in a detection-type mode (i.e. finding and fixing mistakes).

What is detection?

In a detection or 'firefighting' environment, the emphasis is on the product, procedures and/or service deliverables and the downstream producing and delivery processes; it is about getting rid of the bad things after they have taken place. Considerable effort is expended on after-the-event inspecting, troubleshooting, checking, and testing of the product and/or service and providing reactive 'quick fixes' in a bid to ensure that only conforming products and services are delivered to the customer. In this approach, there is a lack of creative and systematic work activity, with planning and improvements being neglected and defects being identified late in the process, with all the financial implications of this in terms

of the working capital employed. Detection will not improve quality but only highlight when it is not present, and sometimes it does not even manage to do this. Problems in the process are not removed but contained, and are likely to come back. Inspection is the primary means of control in a 'policeman'- or 'goalkeeper'-type role and thereby a 'producing' versus 'checking' situation is encouraged, leading to confusion over people's responsibilities for quality – 'Can I, the producer, get my deliverables past the checker?' It also leads to the belief that non-conformances are due to the product/service not being inspected enough and also that operators, not the system, are the sole cause of the problem.

A question which organizations operating in this mode must answer is: does the checking of work by inspectors affect an operator's pride in the job? The production–inspection relationship is vividly described by McKenzie (1989).

With a detection approach to quality, non-conforming 'products' (products are considered in their widest sense) are culled, sorted and graded, and decisions made on concessions, rework, reblending, repair, downgrading, scrap, and disposal. It is not unusual to find products going through this cycle more than once. While a detection-type system may prevent non-conforming product, services and paperwork from being delivered to the customer (internal or external), it does not prevent them being made. Indeed, it is questionable whether such a system does in fact find and remove all non-conforming products and services. Physical and mental fatigue decreases the efficiency of inspection and it is commonly claimed that, at best, 100 per cent inspection is only 80 per cent effective. It is often found that with a detection approach the customer also inspects the incoming product/service; thus the customer becomes a part of the organization's quality control system.

In this type of approach a non-conforming product must be made and a service delivered before the process can be adjusted; this is inherently inefficient in that it creates waste in all its various forms: all the action is 'after the event' and backward-looking. The emphasis is on 'today's events', with little attempt to learn from the lessons of the current problem or crisis. It should not be forgotten that the scrap, rework, retesting, reblending, etc. are extra efforts, and represent costs over and above what has been budgeted and which ultimately will result in a reduction of bottom-line profit. Figure 1.5, taken from the Ford Motor Company three-day statistical process control course notes (1985), is a schematic illustration of a detection-type system.

An environment in which the emphasis is on making good non-conformance rather than preventing it from arising in the first place is not ideal for engendering team spirit, co-operation and a good climate for work. The focus tends to be on switching the blame to others, people making themselves 'fireproof', not being prepared to accept responsibility and ownership, and taking disciplinary action against people who make mistakes. In general, this behaviour and attitude emanate from middle management and quickly spread downwards through all levels of the organizational hierarchy.

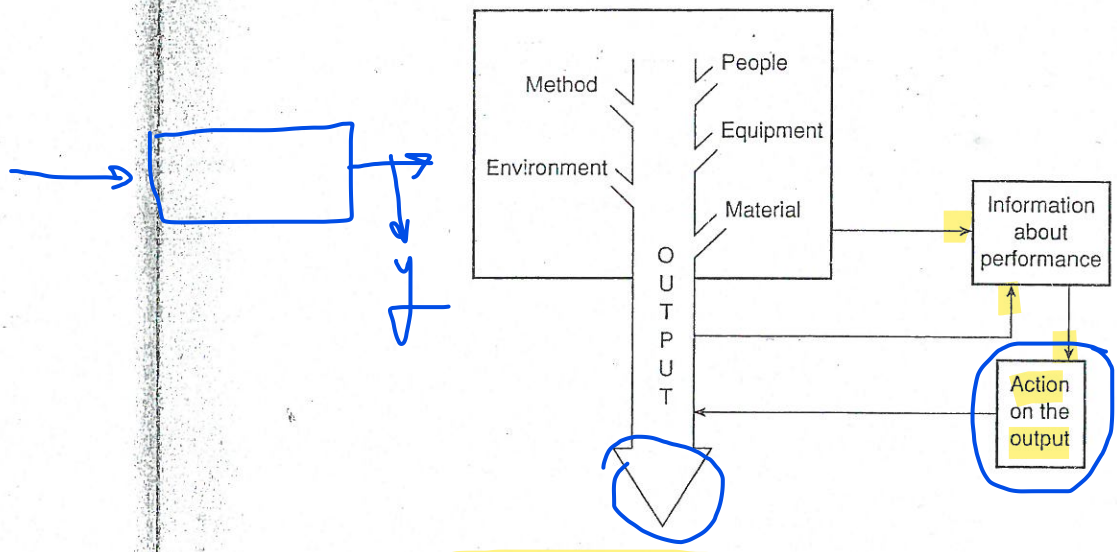

Figure 1.5 A detection-based quality system
Source: Ford Motor Company (1985)

Organizations operating in a detection manner are often preoccupied with the survival of their business and little concerned with making improvements.

Quality assurance

Finding and solving a problem after a non-conformance has been created is not an effective route towards eliminating the root cause of a problem. A lasting and continuous improvement in quality can only be achieved by directing organizational efforts towards planning and preventing problems from occurring at source. This concept leads to the third stage of quality management development, which is quality assurance:

> Part of quality management focused on providing confidence that quality requirements will be fulfilled. (BS EN ISO 9000 (2000))

Examples of additional features acquired when progressing from quality control to quality assurance are, for example, a comprehensive quality management system to increase uniformity and conformity, use of the seven quality control tools (histogram, check sheet, Pareto analysis, cause-and-effect diagram, graphs, control chart and scatter diagram), statistical process control, failure mode and effects analysis (FMEA), and the gathering and use of quality costs. The quality systems and practices are likely to have met, as a minimum, the requirements of the BS EN ISO 9001 (2000). Above all one would expect to see a shift in emphasis from mere detection towards prevention of non-conformances. In short,

more emphasis is placed on advanced quality planning, training, critical problem-solving tasks, improving the design of the product, process and services, improving control over the process and involving and motivating people.

What is prevention?

Quality assurance is a prevention-based system which improves product and service quality, and increases productivity by placing the emphasis on product, service and process design. By concentrating on source activities and integrating quality into the planning and design stage, it stops non-conforming product being produced or non-conforming services being delivered in the first place; even when defects occur they are identified early in the process. This is a proactive approach compared with detection, which is reactive. There is a clear change of emphasis from downstream to the upstream processes and from product to process (see figure 1.6); 'product out' to 'customer in'. This change of emphasis can also be considered in terms of the plan, do, check, act (PDCA) cycle. In the detection approach the 'act' part of the cycle is limited, resulting in an incomplete cycle, whereas, with prevention, act is an essential part of individuals and teams striving for continuous improvement as part of their everyday work activities. With

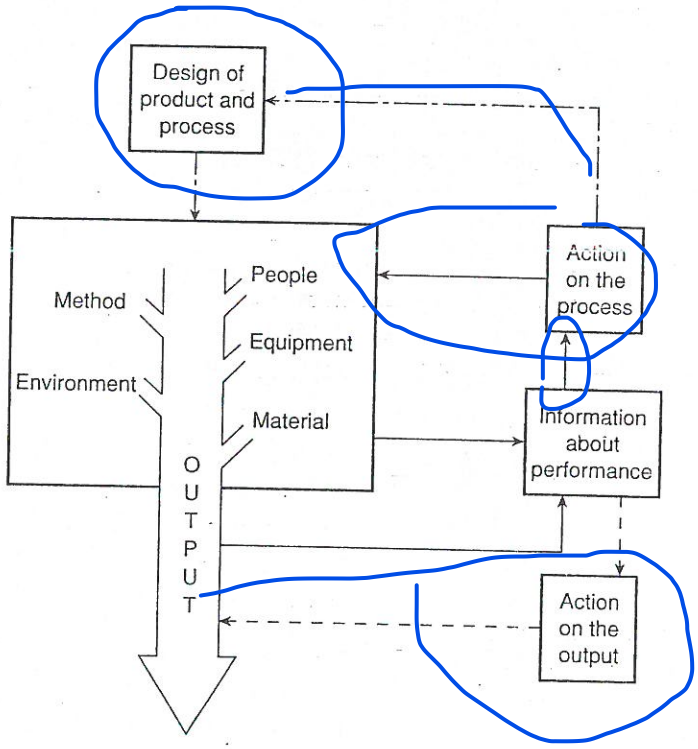

Figure 1.6 A prevention-based quality system
Source: Ford Motor Company (1985)

prevention there is a clearly defined feedback loop with both negative and positive feedback into the process, product, and service development system.

Quality is created in the design stage and not at the later control stage; the majority of quality-related problems are caused by poor or unsuitable designs of products and processes. In the prevention approach, there is a recognition of the process as defined by its input of people, machines, materials, method, management and environment. It also brings a clearer and deeper sense of responsibility for quality and eliminates the root cause of waste and non-value-adding activity to those actually producing and delivering the product and/or service.

Changing from detection to prevention requires not just the use of a set of tools and techniques, but the development of a new operating philosophy and approach which requires a change in management style and way of thinking. It requires the various departments and functions to work and act together in cross-functional teams to discover the root cause of problems and pursue their elimination. Quality planning and continuous improvement truly begin when top management includes prevention as opposed to detection in its organizational policy and objectives and starts to integrate the improvement efforts of various departments. This leads to the next level, that of total quality management.

Total quality management

The fourth level – TQM – involves the application of quality management principles to all aspects of the organization, including customers and suppliers, and their integration with the key business processes.

Total quality management requires that the principles of quality management should be applied in every branch and at every level in the organization with an emphasis on integration into business practices and a balance between technical, managerial and people issues. It is a company-wide approach to quality, with improvements undertaken on a continuous basis by everyone in the organization. Individual systems, procedures and requirements may be no higher than for a quality assurance level of quality management, but they will pervade every person, activity and function of the organization. It will, however, require a broadening of outlook and skills and an increase in creative activities from those required at the quality assurance level. The spread of the TQM philosophy would also be expected to be accompanied by greater sophistication in the application of tools and techniques, increased emphasis on people (the so-called soft aspects of TQM), process management, improved training and personal development and greater efforts to eliminate wastage and non-value-adding activities. The process will also extend beyond the organization to include partnerships with suppliers and customers and all stakeholders of the business. Activities will be reoriented to focus on the customer, internal and external with the aim to build partnerships and go beyond satisfying the customer to delighting them. The need to self-assess progress towards business excellence is also a key issue.

There are many interpretations and definitions of TQM. Put simply, TQM is the mutual co-operation of everyone in an organization and associated business processes to produce value-for-money products and services which meet and hopefully exceed the needs and expectations of customers. TQM is both a philosophy and a set of guiding principles for managing an organization to the benefit of all stakeholders. The eight quality management principles are defined in BS EN ISO 9000 (2000) as:

- *Customer focus.* Organizations depend on their customers and therefore should understand current and future customer needs, meet customer requirements and strive to exceed customer expectations.
- *Leadership.* Leaders establish unity of purpose and direction of the organization. They should create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives.
- *Involvement of people.* People at all levels are the essence of an organization and their full involvement enables their abilities to be used for the organization's benefit.
- *Process approach.* A desired result is achieved more efficiently when activities and related resources are managed as a process.
- *System approach to management.* Identifying, understanding and managing interrelated processes as a system contributes to the organization's effectiveness and efficiency in achieving its objective.
- *Continual improvement.* Continual improvement of the organization's overall performance should be a permanent objective of the organization.
- *Factual approach to decision-making.* Effective decisions are based on the analysis of data and information.
- *Mutually beneficial supplier relationships.* An organization and its suppliers are interdependent and a mutually beneficial relationship enhances the ability of both to create value.

The Key Elements of TQM

Despite the divergence of views on what constitutes TQM, there are a number of key elements in the various definitions which are now summarized. Other chapters will provide more detail of these elements.

Commitment and leadership of the chief executive officer

Without the total demonstrated commitment of the chief executive officer and his or her immediate executives and other senior managers, nothing much will happen and anything that does will not be permanent. They have to take charge

personally, lead the process, provide direction, and exercise forceful leadership, including dealing with those employees who block improvement and impetus. However, while some specific actions are required to give TQM a focus, as quickly as possible it must be seen as the style of management and the natural way of operating a business.

(2) Planning and organization

Planning and organization feature in a number of facets of the improvement process, including:

- Developing a clear long-term strategy for TQM which is integrated with other strategies such as information technology, production/operations and human resources and also with the business plans of the organization.
- Deployment of the policies through all stages of the organizational hierarchy with objectives, targets, projects and resources agreed with those responsible for ensuring that the policies are turned from words into actions (see chapter 8).
- Building product and service quality into designs and processes.
- Developing prevention-based activities (e.g. mistake-proofing devices).
- Putting quality assurance procedures into place which facilitate closed-loop corrective action.
- Planning the approach to be taken to the effective use of quality systems, procedures and tools and techniques, in the context of the overall strategy.
- Developing the organization and infrastructure to support the improvement activities. This includes allocating the necessary resources to support them. While it is recommended that some form of steering activity should be set up to provide direction and support and make people responsible for co-ordinating and facilitating improvement, the infrastructure should not be seen as separate from the management structure.
- Pursuing standardization, systematization and simplification of work instructions, procedures and systems.

(3) Using tools and techniques

To support and develop a process of continuous improvement an organization will need to use a selection of tools and techniques within a problem-solving approach. Without the effective employment and mix of tools and techniques it will be difficult to solve problems. The tools and techniques should be used to facilitate improvement and be integrated into the routine operation of the business. The organization should develop a route map for the tools and techniques which it intends to apply. The use of tools and techniques as the means will help to get the process of improvement started: employees use them feel involved and that they are

making a contribution, quality awareness is enhanced, behaviour and attitude change starts to happen, and projects are brought to a satisfactory conclusion.

Education and training

Employees, from top to bottom of an organization, should be provided with the right level and standard of education and training to ensure that their general awareness and understanding of quality management concepts, skills, competencies, and attitudes are appropriate and suited to the continuous improvement philosophy; it also provides a common language throughout the business. A formal programme of education and training needs to be planned and provided on a timely and regular basis to enable people to cope with increasingly complex problems. It should suit the operational conditions of the business: is training done in a cascade mode (everyone is given the same basic training within a set time-frame) or is an infusion mode (training provided as a gradual progression to functions and departments on a need-to-know basis) more suitable? This programme should be viewed as an investment in developing the ability and knowledge of people and helping them realize their potential. Without training it is difficult to solve problems, and, without education, behaviour and attitude change will not take place. The training programme must also focus on helping managers think through what improvements are achievable in their areas of responsibility. It also has to be recognized that not all employees will have received and acquired adequate levels of education. The structure of the training programme may incorporate some updating of basic educational skills in numeracy and literacy, but it must promote continuing education and self-development. In this way, the latent potential of many employees will be released and the best use of every person's ability achieved.

Involvement

There must be a commitment and structure to the development of employees, with recognition that they are an asset which appreciates over time. All available means, from suggestion schemes to various forms of teamwork, must be considered for achieving broad employee interest, participation and contribution in the improvement process; management must be prepared to share information and some of their powers and responsibilities and loosen the reins. This also involves seeking and listening carefully to the views of employees and acting upon their suggestions. Part of the approach to TQM is to ensure that everyone has a clear understanding of what is required of them, how their processes relate to the business as a whole and how their internal customers are dependent upon them. The more people who understand the business and what is going on around

them, the greater the role they can play in the improvement process. People have got to be encouraged to control, manage and improve the processes which are within their sphere of responsibility.

Teamwork

Teamwork needs to be practised in a number of forms. Consideration needs to be given to the operating characteristics of the teams employed, how they fit into the organizational structure and the roles of member, team leader, sponsor and facilitator. Teamwork is one of the key features of involvement, and without it difficulty will be found in gaining the commitment and participation of people throughout the organization. It is also a means of maximizing the output and value of individuals.

There is also a need to recognize positive performance and achievement and celebrate and reward success. People must see the results of their activities and that the improvements they have made really do count. This needs to be constantly encouraged through active and open communication. If TQM is to be successful it is essential that communication must be effective and widespread. Sometimes managers are good talkers but poor communicators.

Measurement and feedback

Measurement, from a baseline, needs to be made continually against a series of key results indicators – internal and external – in order to provide encouragement that things are getting better (i.e. fact rather than opinion). External indicators are the most important as they relate to customer perceptions of product and/or service improvement. The indicators should be developed from existing business measures, external, competitive and functional generic and internal benchmarking, as well as customer surveys and other means of external input. This enables progress and feedback to be clearly assessed against a roadmap or checkpoints. From these measurements, action plans must be developed to meet objectives and bridge gaps.

Ensuring that the culture is conducive to continuous improvement activity

It is necessary to create an organizational culture which is conducive to continuous improvement and in which everyone can participate. Quality assurance also needs to be integrated into all an organization's processes and functions. This requires changing people's behaviour, attitudes and working practices in a number of ways. For example:

- Everyone in the organization must recognize that whatever they do can be improved. They must be involved in 'improving' the processes under their control on a continuous basis and take personal responsibility for their own quality assurance.
- Employees must be encouraged to identify wastage in all its various forms to take out cost and get more value into a product or service.
- Employees can stop a process without reference to management if they consider it to be not functioning correctly.
- Employees must be inspecting their own work.
- Defects must not be passed, in whatever form, on to the next process. The internal customer–supplier relationship (everyone for whom you perform a task or service or to whom you provide information is a customer) must be recognized.
- Each person must be committed to satisfying their customers, both internal and external.
- External suppliers and customers must be integrated into the improvement process.
- Mistakes must be viewed as an improvement opportunity. In the words of the Japanese, every mistake is a pearl to be cherished.
- Honesty, sincerity and care must be an integral part of daily business life.

Changing people's behaviour and attitudes is one of the most difficult tasks facing management, requiring considerable powers and skills of motivation and persuasion; considerable thought needs to be given to facilitating and managing culture change. In the words of a government chief engineer in the Hong Kong civil engineering department, 'Getting the quality system registered to ISO 9001 is the easy bit, it is changing people's attitudes and getting them committed to continuous improvement that is presenting the greatest challenge.'

Summary: Developing TQM

In concluding this chapter a list of points is offered which organizations should keep in mind when developing TQM. Many of them are expanded upon in the chapters that follow.

Organizing

- There is no ideal way of assuring the quality of an organization's products or services. What matters is that improvement does occur, that it is cost-effective, and that it is never-ending.
- There is no one best way of starting a process of continuous improvement which suits all organizations and cultures.

- Senior management's commitment is vital in order to gain credibility, assure continuity and establish longevity of the process. They need to think deeply about the subject and commit to it the necessary resources. Managers must also place more emphasis on leadership and create an environment in which people can develop and apply, to full potential, all their skills.
- Planning should have a 10-year horizon in order to ensure that the principles of TQM are firmly rooted in the culture of the organization. Patience and tenacity are key virtues.
- Quality objectives and strategies must be developed and deployed down through the organizational hierarchy, along with agreeing goals for improvement.
- The improvement process needs to be integrated with other organizational improvement initiatives and business strategies.
- A multi-disciplinary TQM steering committee chaired by the chief executive must be established and appropriate infrastructure established to support the improvement process. It is important that this infrastructure is integrated into the existing structure.
- At the outset the main quality problems must be identified and tackled by the senior management team – 'lead by example'.

Systems and techniques

- The quality management system must be well documented, provide direction and feedback and be audited internally on a regular and effective basis.
- The day-to-day control and assurance activity must be separated from the improvement process.
- There must be a dedication to removing basic causes of errors and wastage.
- At the design stage all potential non-conformances must be identified and eliminated.
- A system by which all staff can raise those problems which prevent them turning in an error-free performance should be in place.
- It should be recognized that tools, techniques, systems, and packages are used at different stages in different organizations in their development of TQM.
- The timing of the introduction of a particular tool, technique, system or package is crucial to its success.
- Mistake-proofing of operations should be investigated.
- Statistical methods should be used.

Measurement and feedback

- It should be recognized that customer satisfaction is a business issue and that all processes should work towards satisfying the customer.

- All available means must be used to determine customer requirements and develop systems and procedures to assess conformance.
- It should be easy for the internal and external customer to complain. Ensure that all customer complaints are picked up and analysed, and that there is appropriate feedback.
- The attitude that 'the next process/person is the customer' must be encouraged.
- Measures of customer satisfaction and quality indicators for all internal departments must be developed.
- Regular self-assessment of the progress being made with quality improvement against the criteria of the Malcolm Baldrige National Quality Award for Performance Excellence (2005) and the EFQM excellence model (2006), or a similar model should be carried out. This will assist in making the quality improvement efforts more efficient and cost effective.

Changing the culture

- All aspects of customer and supplier relationships should be developed, improved and assessed on a regular basis.
- Teamwork must be practised at all levels.
- People must be involved at all stages of the improvement process, and not simply in those aspects which directly affect their role.
- Education and training should be continuous and widespread, in order to foster changes in attitudes and behaviour and to improve the skills base of the organization.
- Recognize that change is continuous and must be embedded in the culture of the organization.

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Chapter Thirteen

Quality Management Systems

B. G. Dale

Introduction

This chapter opens by examining the concept of quality assurance and the responsibilities of people within an organization for carrying out the activity. A quality system is defined and the background of quality system standards traced, the key features of the ISO 9000 series (1994) are examined, implementation guidelines and issues outlined, the quality system assessment and registration reviewed and the benefits and limitations highlighted. A model is also presented which outlines what is required for a small company to successfully achieve ISO 9000 series registration. Much has already been written about quality systems and standards (Dale and Oakland 1994; Davies 1997; Hall 1992; Jackson and Ashton 1993; Lamprecht 1992, 1993; Rothery 1993), and there are the standards themselves. This chapter is therefore restricted to an overview of the key features and issues.

What is Quality Assurance?

Quality assurance is defined in BS EN ISO 9000 (2000) as:

> Part of quality management, focused on providing confidence that quality requirements will be fulfilled.

Quality assurance is often regarded as discreet policing by the quality assurance department. This is not so. The ideal role of the department is to oversee the whole process of quality assurance within an organization, provide guidance, advice on the assignment of roles and responsibilities to be undertaken by each

function and person, and address weaknesses in the system. Quality assurance needs to be an integral part of all of an organization's processes and functions, from the conception of an idea and throughout the life-cycle of the product or service: determining customer needs and requirements, planning and designing, production, delivery and after-sales service.

The objective should be to get every person in the organization to take personal responsibility for the quality of the processes for which they are accountable. This includes treating following processes as 'customers' and endeavouring to transfer conforming products, services, materials and documents to them, monitoring quality performance, analysing non-conformance data, taking both short- and long-term action to prevent the repetition of mistakes, and promoting the feed forward and feedback of data. The emphasis should be on the pursuance of corrective and preventative actions and procedures and non-conformance investigation in a thorough manner with closed-loop effectiveness. It is also necessary for everyone to perform their tasks in accordance with their training, their procedures and as defined by the quality management system.

The main objective of quality assurance activity is to build quality into the product and/or service during the upstream design and planning processes and in this way give confidence to a customer that a product and/or service performs as they expect. Quality function deployment, FMEA, design of experiments, design reviews, design for manufacturability/assembly and quality audits are all part of an advanced product quality planning process, and of considerable assistance in the pursuance of this goal.

Quality assurance activity which is planned and managed along these lines will strengthen an organization's TQM efforts.

What is a Quality Management System?

A quality management system is defined in BS EN ISO 9000 (2000) as:

> a management system to direct and control an organization with regard to quality.

The purpose of a quality management system is to establish a framework of reference points to ensure that every time a process is performed the same information, methods, skills and controls are used and applied in a consistent manner. In this way it helps to define clear requirements, communicate policies and procedures, monitor how work is performed and improve teamwork.

Documentary evidence about the quality management system is fundamental to quality assurance and takes several forms.

- A company quality manual (sometimes called a level 1 document) provides a concise statement of the quality policy and quality management objectives as part of the company objectives. ISO 10013 (2001) provides useful guidelines on the development and preparation of quality manuals. A quality manual is defined in BS EN ISO 9000 (2000) as:

> a document specifying the quality management system of an organization.

A procedures manual (sometimes referred to as a level 2 document) describes how the system functions, gives the structure and responsibilities for each department/unit and details the practices to be followed in the organization.

2. Work instructions, specifications, methods of performance and detailed methods for performing work activities for a third level of documents.
3. In addition there is often a database containing all other reference documents (e.g. forms, standards, drawings, reference information, supplier list, etc.).

The quality management system documentation helps to ensure that employees know what they should be doing, along with the appropriate means for doing it. It also provides evidence to those who wish to assess the system.

The quality management system should define and cover all facets of an organization's operation, from identifying and meeting the needs and requirements of customers to design, planning, purchasing, manufacturing, packaging, storage, delivery, installation and service, together with all relevant activities carried out within these functions. It deals with organization, responsibilities, procedures and processes. Put simply, a quality system is good management practice.

A quality management system, if it is to be comprehensive and effective, must cover all these activities and facets and must be developed in relation to the corporate strategy of the company. The system developed can be tested against a reference base and improvements made. This reference base is a 'quality management system standard' which describes demonstrable features or conditions that are assessable. An organization's quality management system is usually assessed by the customer (known as second-party certification) or by a party which is independent of the customer and organization (known as third-party certification). It is usual to certify that the system conforms to a specific quality management system standard (e.g. ISO 9001) and whether the system is fully implemented and effective. This process is known as certification.

A quality management system which embraces quality management objectives, policies, organization and procedures, and which can demonstrate, by assessment, compliance with ISO 9001 or that of a major purchaser, provides an effective managerial framework on which to build a company-wide approach to a process of continuous improvement.

The Development of Quality Management System Standards

Irrespective of the approach taken to TQM and the quality management maturity of the organization, a business may need to demonstrate to customers that its processes are both effective and under control and that there is effective control over procedures and systems. The pressure for proof that systems and procedures are in place, and working in an effective manner, led to the demand for quality assurance based on the development of quality management system standards. The origins of this can be traced back to the 1950s when the US Department of Defense and the UK Ministry of Defence saw a need for greater reliability in purchased products and a reduced reliance on customer or purchaser inspection as the main assurances of quality.

The early standards were contractual requirements by major purchasers of their suppliers. Such standards were customer- and sector-specific and designed to be used in contractual situations in the industries for which they were designed and in which they operated; the standards had a strong bias towards internal quality control, which was primarily inspection. Many purchasers developed their own requirements and methods of assessment, which involved visiting the supplier to examine the degree to which their operating procedures and systems followed their requirements. This method of assessment is called second-party certification.

The current quality management system standards evolved from military standards, for example, the American Military Standard MIL-Q-9858(a), the North Atlantic Treaty Organization (NATO) Allied Quality Assurance Publications (AQAPs), and nuclear and power industry requirements such as the Canadian Standards Association (CSA) CSA-Z299. There had also been a considerable contribution to formalized quality assurance procedures by NASA, the controlling body for the American space programme, the Polaris submarine programme and the nuclear power-generating industry. There has been considerable co-operation between America, Canada and Britain in relation to quality system development.

The UK defence standard for quality systems was first published in 1973 by the Procurement Executive of the Ministry of Defence (MOD) – the DEF-STAN 05-21 series. This was a result of its change in policy on the acceptance of contractor-manufactured product. The previous acceptance policy of the MOD involved inspecting the manufactured product by its own team of inspectors. This policy required considerable resources involved with the inspection and the paperwork associated with contract release forms. These standards were virtual copies of the American-derived NATO AQAPs used by NATO in defence procurement, which were based on MIL-Q-9858(a). The AQAP standards (AQAP 1–14) addressed the problem of achieving consistency and total product interchangeability in the supply of standardized weapons and ammunition coming from many different suppliers and intended for the different national military units which

make up NATO. The MOD used the DEF-STAN 05-21 series to approve potential suppliers and audit current suppliers in contractual situations. It was a requirement that a supplier developed their quality management system to meet the clauses set out in these standards for them to be included on the MOD defence contractors list. These standards made the contractor responsible for the quality and reliability of his product; they became the basis for contracts with the MOD from April 1973. One principle is that the prime contractors must conduct assessments of their own suppliers in line with the requirements of these standards. The 05-21 series was withdrawn in 1985 and MOD assessments were carried out using the similar AQAP standards. From September 1991, the MOD has, in the main, relied on third-party assessment against the ISO 9000 series of standards. This type of situation relates to specific military applications such as aircraft construction, ammunition and explosives, packaging and software. A new set of defence standards (the 05–90 series, 05–91 to 05–95), which includes the ISO 9000 series plus special military purchase requirements, is used to assess suppliers in contractual situations.

In 1972 the British Standards Institution (BSI) published BS 4891 (1972), *A Guide to Quality Assurance*, which set out guidance to organizations on quality and its management, and was intended as a guide to companies developing their quality management systems; this standard was withdrawn in 1994. This was followed in 1974 by the issue of BS 5179, which was a three-part standard *A Guide to the Operation and Evaluation of Quality Assurance Systems*; this standard was withdrawn in 1981 after being superseded in 1979 by the first issue of BS 5750.

During the mid-1970s there was a proliferation of quality system standards produced by a variety of second- and third-party organizations. The Warner report (1977), *Standards and Specifications in the Engineering Industries*, stressed the need for a national standard for quality management systems, to reduce the number of assessments to which suppliers were being subjected by their customers. It pointed to the shortcomings and fragmented nature of the British system of standards. It was recommended that British Standards be produced to provide the single base document for quality systems. Subsequently, in 1979, the British Standards Institution issued the BS 5750 series of quality management system standards.

It was the British Standards Institution which formally proposed the formation of a new technical committee (ISO/TC 176) to develop international standards for quality assurance, techniques and practices (this committee is responsible for developing and maintaining the ISO 9000 family of standards). Some 20 countries originally participated in the development of what was to become the ISO 9000 series. In 1987 the series of international standards on quality management systems was first published by the International Organization for Standardization (ISO; a federation of some 140 countries' national standards institutes). This initial version of the standards, while reflecting various national approaches and international requirements, was based largely on the 1979

version of the BS 5750 series and the eight or so years of UK user experience, mainly in manufacturing industry, and the Canadian CSA Z299 series. The text of these international standards was approved as suitable for issue as a British Standard with dual numbers – BS 5750: Parts 0 to 3 (1987) and extended in 1991 to services and software as Parts 8 and 13 (1991), but these were as guidance-only documents.

The ISO 9000 series was adopted by CEN (the European Committee for Standardization) and CENELEC (the European Committee for Electrotechnical Standardization) as the EN 29000 series, thus harmonizing the approach to quality systems in the European Community, the standard at this stage having three numbers: national, European and international. It has perhaps had the most significant and far-reaching impact on international standardization of any set of standards. An excellent account of the historical background of the ISO 9000 series is provided by Spickernell (1991).

The ISO 9000 series has been revised on the basis of international implementation experience and was reissued in summer 1994. This revision was meant to be interim, involving minor changes pending a full revision (ISO standards are meant to be reviewed and, if necessary, revised every five years). All ISO standards go through at least three phases – working draft (WD), committee draft (CD) and draft international standard (DIS) – during their development. This process aims to get as much feedback as possible from users. Drafts at any stage can be circulated many times until the required consensus is reached. The phase 1 minor revisions (1994) were undertaken with the aim that no new requirements should be introduced, and that the standards should be clarified to aid implementation and assessment and to remove internal inconsistencies. The second and more thorough set of revisions in the 2000 version has seen a major rewrite which has enhanced the existing standards by including requirements for concepts typically associated with TQM and continuous improvement. The standards, which are now more in-depth, represent a business-oriented approach and will be more demanding for many organizations.

Government initiatives

In July 1982 a UK government White Paper was published on standards, quality and international competitiveness which triggered a National Quality Campaign and suggested that, to maintain standards, more independent certification should be encouraged and that accreditation by a central agency would uphold the standards of certification bodies. The National Accreditation Council for Certification Bodies (NACCB) was set up in June 1985 by the Department of Trade and Industry as the national statutory body with the task of assessing the independence, integrity and technical competence of any certification bodies applying for government accreditation in four areas: approval of quality systems,

product conformity, product approval, and approval of personnel engaged in quality verification. At the same time the National Measurement Accreditation Service (NAMAS) was set up to register laboratories and test houses. NAMAS was formed by the amalgamation of the British Calibration Service (BCS) and the National Testing Laboratory Accreditation Service (NATLAS), also in 1985, and both parts of the Civil Service. In August 1995 and in response to market demand, NACCB and NAMAS merged to create a single accreditation authority – the United Kingdom Accreditation Service (UKAS), which is recognized and promoted by the DTI. The objective is to bring economies of scale and improved efficiency to UK accreditation. Accreditation allows a certification body to demonstrate its competence and independence. The accreditation of certification bodies by UKAS is to enhance mutual recognition of test results and certification among those certification bodies operating to an agreed set of principles and methodologies. UKAS is also subjected to assessment by similar bodies elsewhere in the world for multilateral recognition with other accreditation bodies.

To be eligible for accreditation, third-party certification bodies are required to meet criteria outlined in three European (CEN) standards, available in the UK as British Standards, based on the European EN 45000 series for certification bodies issuing certificates of product conformity; for certification bodies certificating that suppliers' quality systems comply with appropriate standards, normally BS EN ISO 9001, 9002 and 9003; and for certification bodies certificating the competence of personnel. These standards will be incorporated into International Standards, as ISO already have guides such as ISO 62 and ISO 25.

This set of standards helps to promote confidence in the way in which product and quality system certification activities are performed and in the accreditation systems and bodies themselves. From the accreditation granted it will be clear whether the certification body is accredited for quality system assessment only, and in which fields, or whether it has the additional qualification of being accredited to certificate conformity of product.

Those companies which have been assessed by an accredited certification body can use the symbol of the Royal Crown if the scope of the certification applied for falls within the scope of accreditation of the accredited certification body. The use of this Royal Crown lends authority and assurance. This is known as the National Accreditation mark. However, there is a degree of independent accreditation and, in the UK, a number of certification bodies are registered with the Accreditation Service for Certifying Bodies, providing an alternative to UKAS. International accreditation is now well established through the International Accreditation Forum (IAF) and a range of mutual recognition agreements (MRAs). The aim is for audit, certification and accreditation to be accepted across the world.

The Department of Trade and Industry, through the National Quality Campaign initiated as a result of the 1982 White Paper, and its 'Managing into the 1990s' programme, actively encouraged British industry to consider its approach

to quality management more seriously; one of the methods advocated is registration with the BS EN ISO 9000 quality management system series. They issue a central register of quality-assured companies. This register lists the firms whose quality management system has been approved by major users or independent third-party assessment bodies, which means the investigation is done by an independent organization, unrelated to buyer or seller. It also identifies the assessment standard used – the BS EN ISO 9000 series or its equivalent -- and details of the certification body.

ISO 9000 is a set of international standards that define quality management systems, while QS 9000 is a quality management system standard used in the automotive industry. ISO 9000 focuses on customer satisfaction and continuous improvement, while QS 9000 includes additional requirements like product planning, design, and development. ISO 9000 certification applies to various industries, while QS 9000 certification is designed for the automotive industry.

Acceptance of the ISO 9001 series of standards

The set of requirements outlined in ISO 9001 can be supplemented for specific industries or products by 'quality assurance specifications', 'ISO guidance notes and codes of practice' which provide more detail.

The Chrysler Corporation, Ford Motor Company and General Motors Corporation (the so-called 'Big Three') have produced a common quality system assessment standard (QS 9000) which is an industry-specific scheme. This standard, on which development work started in 1988, was first released in August 1994, with a world-wide version in February 1995. It harmonizes the separate quality system standard requirements of these three companies and will reduce the current level of duplication in terms of information requested from suppliers leading to economic advantage. These three organizations have had comprehensive quality assurance systems in place at their sites for some considerable time, and have required suppliers to meet the standards of these systems. They view this as a platform to enhance the quality and performance of their suppliers. The first section of QS 9000 aligns itself with the elements of ISO 9001. This industry standard has recently been incorporated into the ISO network and issued as ISO TS 16949. The following are some examples of the prescriptive requirements:

- Advanced product quality planning shall be in place, supported by a multi-disciplinary approach for decision-making.
- Trends in quality, operational performance, current quality levels and customer satisfaction shall be determined and documented. These should be compared by competitive analysis and/or benchmarking and be reviewed by management.
- Failure mode and effects analysis shall be used.
- Capability studies are mandatory and minimum capability indices are stipulated.

The second (sector-specific) section contains additional but common and harmonized requirements of Chrysler, Ford and General Motors covering the production part approval process, continuous improvement, identification of key product and process parameters, process capability performance and measurement system studies on product and process parameters, and development of

control plans. Sixteen typical examples are cited of areas of such activities, together with 14 techniques/methodologies to support them. The third section addresses customer-specific additional and non-general requirements.

QS 9000 was initially confined to the first-tier suppliers of manufacturing plants in the US, but its implementation has spread world-wide and down the supplier chain. Registration to QS 9000 has now become the norm in the automotive industry.

Other similar sector-specific derivatives of ISO 9001 include TL 9000, which is the world's first quality system metrics for the global telecommunications industry developed and managed by the Quality Excellence for Suppliers of Telecommunications Forum and AS 9000 in the aviation and aerospace industry. The ISO has a policy and commitment to sector versions of ISO 9001 where a need is demonstrated.

Registration to ISO 9001 is a useful foundation leading to the development of a quality system to meet the independent system requirements of customers. A number of major purchasers use this registration as the 'first pass' over a supplier's quality system. They will take ISO 9001 as the base, and only assess those elements of the system which they believe are particularly sensitive to them as purchasers (e.g. those clauses which are not covered in the ISO 9000 series – customers often require the supplier to have additional features to the series supplanted within the system or those clauses without sufficient detail amended to the satisfaction of the customer).

In 1993 Dr John Symonds (internal consultant for environment, health and safety, and quality of Mobil Services Company) launched the first world-wide survey of ISO 9000 certificates issued in different countries by independent quality system certification bodies. The International Organization for Standardization has taken over responsibility for this annual survey, which has been extended to cover the ISO 14000 environmental management systems standards. The survey report details world, regional and country breakdowns of registrations and also industry-sector breakdown by country. The thirteenth cycle of the survey (ISO 2005) shows that up to the end of 2005 at least 776.608 ISO 9000 certificates had been awarded in 161 countries. The survey also shows that in the same time-frame at least 111.162 ISO 14000 certificates had been awarded in 138 countries. The trend in registrations is upwards.

The ISO 9000 Series of Standards: An Overview

Introduction

In simple terms, the objective of the ISO 9000 series is to give purchasers an assurance that the quality of the products and/or services provided by a supplier meets their requirements. The series of standards defines and sets out a

definitive list of features and characteristics which it is considered should be present in an organization's management control system through documented policies, manual and procedures, which help to ensure that quality is built into a process and is achieved. Amongst other things it ensures that an organization has a quality policy, that procedures are standardized, that defects are monitored, that corrective and preventative action systems are in place, and that management reviews the system. The aim is systematic quality assurance and control. It is the broad principles of control, in general terms, which are defined in the standards, and not the specific methods by which control can be achieved. This allows the standard to be interpreted and applied in a wide range of situations and environments, and allows each organization to develop its own system and then test it against the standard. However, this leads to criticisms of vagueness.

The series of standards can be used in three ways:

- Provision of guidance to organizations to assist them in developing their quality systems
- As a purchasing standard (when specified in contracts)
- As an assessment standard to be used by both second-party and third-party organizations

Functions of the standards and their various parts

The ISO 9000 family of standards consists of four primary standards: ISO 9000, ISO 9001, ISO 9004 and ISO 19011:

- ISO 9000: Quality Management Systems: Fundamentals and Vocabulary
- ISO 9001: Quality Management Systems: Requirements
- ISO 9004: Quality Management Systems: Guidelines for Performance Improvement
- ISO 19011: Guidelines on Quality and Environmental Auditing

The standards have two main functions. The first function identifies the aspects to be covered by an organization's quality system and gives guidance on quality management and application of the standards. The second function defines in detail the features and characteristics of a quality management system which are considered essential for the purpose of quality assurance in contractual situations.

ISO 9000 outlines the fundamentals of quality management systems and provides the definitions of the key terms used in ISO 9001 and ISO 9004.

ISO 9001 presents quality management system requirements applicable to all organizations' products and services. It is used for demonstrating system

compliance to customers, for certification of quality management systems, and as the basis for contractual requirements. It requires the following:

- A detailed documentation of quality requirements, processing steps and results.
- Implementation of a set of controls to maintain the system.
- Compliance with the requirements of the 22 sub-elements.

ISO 9004 is a quality management system guidance specification that embraces a holistic approach to performance improvement and customer satisfaction.

ISO 9001 and ISO 9004 are based on a process model that uses the following eight quality management principles that reflect best practice:

- Customer focus
- Leadership
- Involvement of people
- Process approach
- System approach to management
- Continual improvement
- Factual approach to decision-making
- Mutually beneficial supplier relationship

These two standards employ common vocabulary and structure to facilitate their use and are intended to be used together by organizations wishing to develop their systems beyond the minimum requirements of ISO 9001.

ISO 19011 will provide guidance on managing and conducting environmental and quality activities. This standard combines the quality system auditing standard (ISO 10011: Parts 1 to 3) with the environmental system audit standards (ISO 14010, ISO 14011 and ISO 14012).

Principal elements of ISO 9001

The format of the new standard has now just five requirement clauses rather than the 20 of the 1994 version. However, while there are some additional and important requirements in the new standard, all the 20 clauses in the 1994 version can be recognized.

The five main elements are:

1 *Quality management system*
   - General requirements ('The organization shall establish, document, implement and maintain a quality management system and continually

improve its effectiveness in accordance with the requirements of this international standard' – BS EN ISO 9001 (2000))
- Documentation requirements

2 *Management responsibility*
- Management commitment
- Customer focus
- Quality policy
- Planning
- Responsibility, authority and communication

3 *Resource management*
- Provision of resources
- Human resources
- Infrastructure
- Work environment

4 *Product realization*
- Planning of product realization
- Customer-related processes
- Design and development
- Purchasing
- Production and service provision
- Control of monitoring and measuring devices

5 *Measurement, analysis and improvement*
- General ('The organization shall plan and implement the monitoring, measurement, analysis and improvement processes needed: (a) to demonstrate conformity of the product; (b) to ensure conformity of the quality management system and (c) to continually improve the effectiveness of the quality management system' – BS EN ISO 9001 (2000))
- Monitoring and measurement
- Control of non-conforming product
- Analysis of data
- Improvement

The set of requirements outlined in ISO 9001 can be supplemented for specific industries or products by 'quality assurance specifications', 'quality assurance guidance notes' and 'codes of practice' which provide more detail in their form as sector guides.

It is worth mentioning that ISO 14001 (2004) *Environmental Management Systems: Specification with Guidance for Use*, shares many management principles with the ISO 9000 series. The 2000 revision of ISO 9001 has ensured closer compatibility and synergy with the ISO 14001. A number of organizations are considering how they may develop their quality management system as a basis for environmental management: see Wilkinson and Dale (1999) and chapter 14.

Implementation Guidelines for ISO 9001

At this point in the chapter it is useful to quote the guidelines, with some development by the author, advanced by Long et al. (1991), based on their research into the application and use of the ISO 9000 quality system series in small and medium-sized enterprises; the guidelines are also applicable to larger organizations.

- An organization should be clear on the reasons for seeking ISO 9001. Implementation for the wrong reasons will prevent the organization from receiving the full benefits. In addition, it may be found that implementing and maintaining the requirements of the chosen standard is a burden in terms of costs and extra paperwork with no compensating benefits. ISO 9001 registration must therefore not be sought just to satisfy the contractual requirements of major customers or for marketing purposes. Indeed when most competitors have ISO 9001 registration there is little marketing advantage, and in many markets it is now a qualifying criterion.
- The development of a quality management system to meet the requirements of ISO 9001 should be managed as a project, with the identification of key steps, milestones and time-scales. This will prevent progress being sporadic and variable.
- Prior to a programme of ISO 9001 implementation it is important that an internal quality audit is conducted of the existing quality management system by a qualified auditor. This will determine the initial status of the company's quality management system, enable management to assess the amount of work required to meet its requirements and also to plan for systematic implementation of the standard (i.e. a gap analysis). Without this knowledge the project-planning process mentioned above would be impossible. It is important that a realistic timetable is established, because if it is too tight there will be a tendency to do things artificially and this will result in considerable time spent later in debugging the system. On the other hand, if it is too relaxed there may be a tendency to do little in the initial period. Involvement of the appointed management representative during the quality audit is essential.
- For those organizations developing a quality management system for the first time a steering committee should be established comprising all the heads of departments and chaired by the CEO. This type of representation is essential to gain cross-functional support for the project and to help ensure the smooth development and implementation of the system. Participation and commitment from all the heads of department is essential in order to gain employee support for the project, and this will help to ensure the smooth implementation and subsequent maintenance of the standard. In extremely small companies where there is little or no second-tier management

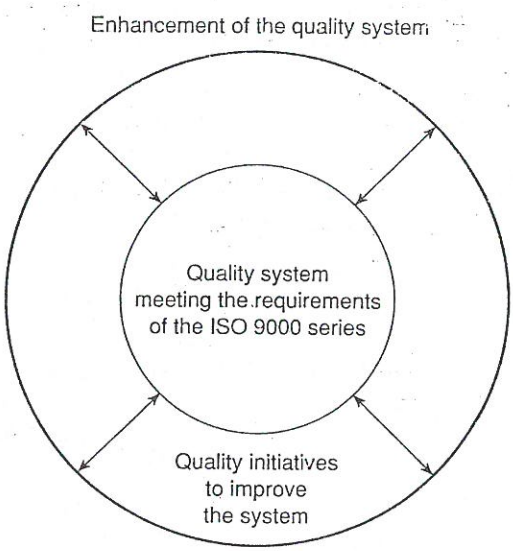

Figure 13.1 Quality system development

the whole-hearted commitment and involvement of the CEO is critical and essential.

- ISO 9001 should be considered as the minimum requirement. Without a documented quality management system there is neither basis nor connected reliable data to monitor the process of quality improvement. Organizations should, however, aim to have a quality system which surpasses the standard's requirements, with new quality initiatives built into the system, as illustrated in figure 13.1 (this is the objective of ISO 9004). A quality management system which meets the requirements of ISO 9001 should in no sense be regarded by senior management as the pinnacle of their quality management achievements. All it says to the outside world is that the organization has controls, procedures and disciplines in place. The organization should treat ISO 9001 registration as a precursor to developing its approach to TQM.
- There is a need to create a conducive environment for the development of a quality management system which meets the requirements of ISO 9001. This can be achieved by the formulation of organizational quality policy and quality objectives. The responsibility of executives in the establishment, maintenance, and development of an ISO 9001 system cannot be over-emphasized. The leadership of senior management and their total commitment to the process of quality system registration to ISO 9001 are vital: it is only they who can deliver the resources and co-operation of appropriate personnel and provide the necessary direction. The CEO, while accepting ultimate responsibility, has, as one would expect, to delegate a variety of tasks. Senior management must not only understand the principles of the ISO 9000 series

but should ensure that the quality policy is implemented and understood by all employees, and that everyone in the organization has quality improvement objectives for their jobs. They also need to react positively to the actions resulting from quality audits.

- Training at all levels within the company is required on the importance of product and service quality in general, and the reasons for the quality system and its benefits in particular. This will help to facilitate the right type of behaviour, attitude and values of employees towards the ISO 9000 series and will encourage total participation. It not only provides the opportunity to answer any questions which employees may have about the standard and the process and the reasons for registration; a systematic approach to quality, education and training will also reduce resistance to change and other obstacles. An element of this awareness can occur if the initial audit is well explained and sympathetically carried out, explaining the reasons for recommendations.
- Once all the above steps have been taken the organization is in a position to commence developing its system to meet the requirements of ISO 9001. Accurate procedures, including operating and working instructions, are required. These procedures must be practical, workable and easily implemented. Wherever possible, they should document what employees are currently doing; they are then most likely to continue in the same way, enabling assessment requirements to be met naturally. Only where the standard would suggest that some modification is required should it be introduced. In writing procedures it is worthwhile to keep in mind how to demonstrate to the auditor that the ISO 9001 requirements have been fulfilled. In simple terms this can be condensed into three principles:
  - Write down what you do
  - Do what you have written down
  - Be in a position to prove it
- 'Ownership' of the procedure is important as personnel who are given responsibilities for writing the procedures must be familiar with the requirements of the ISO 9000 series and be fully conversant with the procedures they are drafting. The use of consultants and management specialists to write procedures is undesirable as they are unlikely to understand fully the 'style' of the company. It is often found that when procedures are written in isolation and then pushed into the working environment as required mandates, it leads to two main problems. Initially there is the problem of changing the way that people work without any perceived gain and benefit. Secondly a formal assessment of the system may reveal differences between what is written and what is actually done. Also with respect to this, it is helpful to document a procedure before trying to improve it, unless the change is easy to make. The use of others to write procedures does not allow for the positive factor of employee involvement and the related communication issues,

and the 'ownership' of the processes by those operating them is lessened. This also happens when there is an over-use of technological aids in producing the procedures. The procedures as they are being developed and/or documented need to be checked to see that they meet the requirements of ISO 9001 and how they impact on other procedures, systems and activities.

- The quality management system must become an integral part of the management process. When it is treated in this way it will ensure that business improvements are incorporated into the system.

Quality Management System Assessment and Registration

When the organization has endorsed its process controls, written the necessary procedures and instructions, and developed its system to meet the requirements of ISO 9001 for which registration is sought, the following key activities need to be accomplished.

- Train and educate staff in the workings and operation of the system and test out the procedures which have been developed. Education and training is a key element for people following procedures, completing the appropriate documentation, taking corrective action seriously, providing timely and accurate information and being aware of what their responsibilities are. The internal audit process must identify any non-conformity with the procedures. In some companies, plans for training are supplemented by people's involvement, for which departmental achievements are rewarded. For example, snapshots of audit requirements undertaken by an implementation team and recognition of performance given by rewards such as mugs, writing blocks, pens, etc.
- It may be beneficial to arrange for a pre-assessment of the system to be carried out by the selected certification body.
- Decide the most appropriate time to go for assessment.
- ISO 9001 registration is conferred by certification bodies who have, in turn, been accredited in the UK by UKAS. The list of accredited certification bodies should be consulted and a 'supplier audit' of them carried out. It is important to establish the scope of the certification body's approval, its fee structure, relevant experience and knowledge in the organization's field of work, reputation, current workload, etc. Goodman (1997) and the British Quality Foundation (BQF) (1997) have published guidance on choosing a certification body, which serves as a useful checklist. In addition to specifying how to conduct the search for a certification body the BQF provides considerable detail on five factors in making this selection, namely cost, scope, sector or general, credibility of the certification body and comfort factors.

- Upon completion of the necessary forms, the chosen certification body will provide a quotation and details of fees. After agreeing a contract, the appropriate documentation is then sent to the certification body to check initial compliance against the standard. In general, a certification body will usually want to see proof that the quality system has been in effective operation for a period of six months. However, this depends on the size of the company and the maturity of its quality management system.
- If the documentation is acceptable as it stands, some certification bodies proceed to the on-site assessment for a preliminary review (pre-audit assessment). At this stage, the company is able to make appropriate modifications and establish corrective actions to take account of the assessors' initial findings and comments.
- The formal assessment involves an in-depth appraisal of the organization's quality management system for compliance with the appropriate part of the standard (see ISO 19011). This is carried out by a small team of independent assessors appointed by the certification body and generally under the supervision of a registered lead assessor, although increasingly for the smaller enterprise only one assessor is used. If the assessors discover a deviation from the requirements or identify a non-conformity with the procedures, a non-conformity report is raised. At the end of the assessment, the non-conformities are reviewed and the assessors make a verbal report to management with their recommendation. The recommendation can be unqualified registration, qualified registration or non-registration. Any non-conformity with the appropriate part of the standard or within the company's system must be rectified, within a prescribed time, before approval is given.
- Once the organization is registered the certification bodies have a system of routine surveillance. The frequency of these surveillance visits varies with the certification body but is generally twice a year. The certification body has the right to make these visits unannounced but rarely does so. The registration usually covers a fixed period of three years, subject to the successful surveillance visits. After three years a quality system reassessment is made. However, the main approach these days is continuous assessment during the surveillance visits. Continuing assessment is planned so that the cumulative effect over a three-year cycle is a complete audit of the quality system. This not only reduces the cost of registration but also minimizes the inconvenience caused to the organization. The continued registration is confirmed in writing following the site visit.

Long et al. (1991), from their research into the implementation of ISO 9001 by organizations, have identified four factors that determine the time taken:

1 The status of the quality management system prior to seeking registration. This status is determined by the presence or otherwise of activities which are

in accordance with one of these three standards and their existence in a documented form. When few activities are in place and/or activities are not documented then more time is required first to document and then to develop the system to meet the appropriate requirements.

2 The complexity of the company in terms of work locations, products manufactured, services offered, type of production and the type and number of production processes and operating instructions. With increasing complexity more procedures and work instructions are required to be documented.

3 The priority given by management to implementing the requirements of the standard and the time they are prepared to set aside for the activity from their normal day-to-day work responsibility affects the progress of implementation. This is especially the case when there are no full-time personnel responsible for quality assurance.

4 A conducive environment is required for the implementation and development of the standard. Resistance to change, lack of understanding about product and service quality and poor attitudes among employees to quality improvement are major obstacles in implementing the requirements of the chosen standard.

ISO 9000 Series Registration: A Model for Small Companies

McTeer and Dale (1996) have developed a model which outlines what is needed for a small company to successfully achieve ISO 9001 registration. The model, which is shown in figure 13.2, consists of the domains of motivation, information, resources and planning; by examining the interaction between them it highlights how progress towards ISO 9001 registration can be enhanced or diminished. The dynamics of the model require that the four domains are raised from their latent state through internal and external motivations. As the factors inflating or deflating the domains strengthen or weaken, so the rate of progress towards installing a quality management system to meet the requirements of ISO 9001 increases or decreases. It is argued that progress by a company towards ISO 9001 registration is only made when the demands of motivation, information and resources occlude. The union of only two domains is insufficient to generate sufficient momentum to promote progress towards registration, and if all the domains are sufficiently deflated the progress to ISO 9001 is halted. Drawing on the paper by McTeer and Dale (1996) the model is now described.

Motivation

In a small company's journey from a primitive quality management system to attaining registration to ISO 9001, the degree of motivation can be regarded as

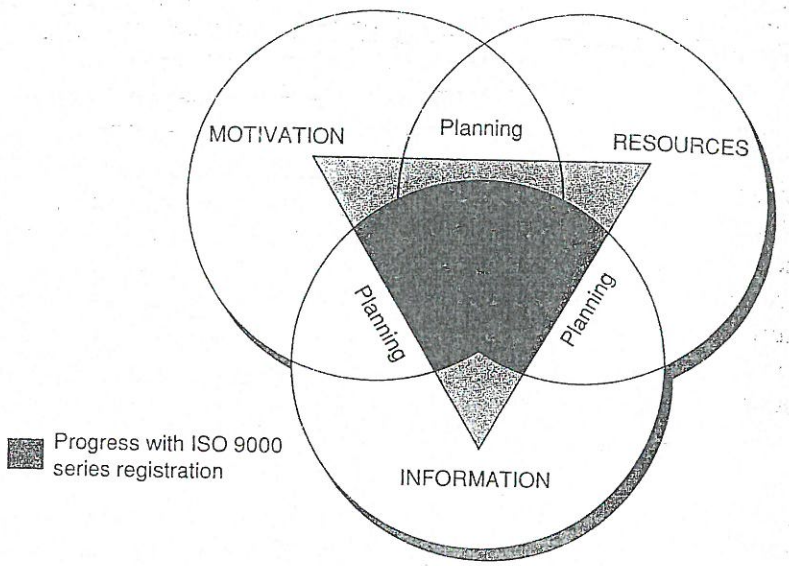

Figure 13.2 An active quality management system regime
Source: McTeer and Dale (1996)

the most important driving force. The degree of motivation can be influenced, both positively and negatively, by internal and external factors. The most powerful motivating force is demand from customers, in particular large ones, for registration and the fear of losing orders; this ensures that the momentum to introduce an ISO 9001 quality management system is maintained. Head office pressure and the impact of senior management are also factors influencing the degree of motivation, for example in making appropriate resources available. The motivation is also affected by employee attitudes and behaviour. Antagonism or apathy from employees towards the company's endeavours to obtain ISO 9001 registration make it difficult to progress quality management system development.

In addition to the primary forces there are a number of secondary forces, including the enhancement of company status in the marketplace, the urge to gain a commercial advantage, and advertising opportunities.

Information

As well as educating the company's quality management system champion to the requirements of ISO 9001, education and training on quality management system principles and practices must also be given to apprise the workforce of what is required from it. This can help to alleviate or avoid many of the problems associated with the acceptance of new working procedures, practices and disciplines. The solution for many companies is to employ management consultants to ensure that the detailed requirements of developing an ISO 9001 system are

achieved, and this can help to overcome many of the problems of comprehending the requirements of the standards. By strengthening the reservoir of quality management knowledge the quality management system champion is better able to communicate effectively with their consultant and better placed to understand the problems and pitfalls of introducing a quality management system. In this way delays in the process of documenting the system, nugatory work and over-documented and bureaucratic quality manuals can be avoided.

If a company is already able to build upon established quality assurance and quality control procedures (no matter how basic) this also helps to speed things up. Failure to raise the level of quality awareness and understand the demands of ISO 9001 leads to confused, frustrated and neglected employees and poorly briefed managers who will tend to restrict the progress towards registration.

Resources

Three resources are significant: time, finance and availability of personnel.

In failing to make or allocate time to the process of introducing a quality management system, programmes will slip, leading to suspension or abandonment as other more urgent tasks appear and take precedence. Time and the availability of personnel are closely coupled. If the quality management system champion is able to delegate work to staff or a management consultant, time pressures can be eased. Extra resources devoted to the development of a quality management system are also instrumental in increasing the pace of progress.

In small companies there is usually little slack time available in the owner's or managing director's day-to-day work activities to dedicate to the development of a quality management system. Further, there is a shortage of staff time to assist in this process and the problem becomes more acute as the number of employees in the company diminishes. Unless compensated by a greater stimulus to produce a quality management system, a lack of time or conflicting priorities will delay or lead to termination of progress. Also for many small companies the budgeting for the process of introducing and then maintaining an ISO 9001 system requires some minor restructuring of finances.

Planning

Planning is crucial to the successful introduction of an ISO 9001 system. Only by formulating a sensible plan which details a timetable of achievable events, milestones and target dates will a company succeed in this objective. This includes recognizing the need for education and training, additional skills, the use of external resources and, in some cases, the need to apprise company employees of the need for ISO 9001 registration. This domain is seen as both the magnet

which draws the motivation, information and resources domains together and the glue that binds them.

Only by drawing together motivation, information and resources can progress be made towards the installation of a quality management system to meet the requirements of the ISO 9001. Figure 13.2 illustrates the situation where the progress of a small company towards ISO 9001 registration is advancing and maturing: the three elements are overlapping and locked together by the planning element. The size of the area of occlusion between these four elements provides a portrayal of the intensity of a small company's progress towards acquiring ISO 9001 registration.

Benefits and Limitations of the ISO 9000 Series of Standards

Since its introduction, the ISO 9000 quality system series has been widely accepted throughout the world. A number of benefits are claimed for the system, including:

- Improved controls, discipline (e.g. prevents the use of short cuts and duplication of activities), procedures, documentation, communication, dissemination and customer satisfaction, quicker identification and resolution of problems, greater consistency (i.e. the job is done the same way, time after time and best practices are shared), increased quality awareness, in particular from those departments and people who traditionally perceived 'quality' not to be their major concern.
- A reduction in errors, customer complaints and non-conforming products, services and costs and the retention of customers.
- Assistance with the liberalization of trade through common rules and language.
- Responsibility for quality issues is placed firmly where it belongs, with the supplier and not the customer.
- Reduction in the number of customer audits and assessments and also a reduction in the time taken, leading to a saving in resources need for such activities.
- Identification of ineffective and surplus procedures and documents and other forms of waste.
- A better working environment.

For details see various BS, ISO and certification body literature, and also Atkin (1987), Bulled (1987), Collyer (1988), Dale and Oakland (1994), DeAngelis (1991), Ford (1988), Hele (1988), Long et al. (1991), Marquardt et al. (1991), Perry (1991) and Rayner and Porter (1991).

A survey carried out by PERA International and Salford University Business Services Limited (1992) of 2,317 firms who had completed a quality consultancy project under the DTI Enterprise Initiative prior to 31 December 1990 found the following benefits:

Overall, 89 per cent of all clients surveyed believed that the introduction of quality management systems had a positive effect on their internal operating efficiency.

Some 48 per cent of firms claimed increased profitability, 76 per cent improved marketing and 26 per cent improved export sales – all attributed the effect to the introduction of quality management systems.

A survey carried out in 1993 by Research International Ltd. for Lloyds Register Quality Assurance assessed the impact of the ISO 9000 series on British business. Some 400 managers from companies of varying size and industrial type were interviewed. Amongst the main findings were the following:

- 89 per cent of companies which had gained ISO 9000 series registration said it met or exceeded their expectations.
- 86 per cent of companies said registration had improved management control, 69 per cent said it had increased their efficiency and productivity and 40 per cent claimed it had reduced their costs.
- Disappointment expressed about the ISO 9000 series was relatively low. Only 3 per cent reported that it had increased their paperwork and 6 per cent said gaining approval was too costly.

A survey carried out by Vanguard Consulting Ltd. (1994) obtained responses from 647 organizations. The conclusion reached was that organizations which achieved success with the ISO 9000 series took a broader view with respect to its implementation than those which sought it because of some form of obligation. Since then there have been numerous surveys (e.g. Brown and van der Wiele 1995; Vloeburghs and Bellens 1996) in various parts of the world. A survey by Buttle (1996), which claims to be 'the most comprehensive national omnisectoral survey into the impact of ISO 9000 on UK business', obtaining data from 1,220 organizations, found, using factor analysis, that the three most important benefits sought from certification were profit improvement, process improvement and marketing benefits. The survey also pointed out widespread willingness to recommend the ISO 9000 series of standards to other firms. On the other hand, a number of difficulties, problems and shortcomings have been reported and discussed. These include:

- Deciding whether registration should be sought for the whole company or just one unit/division/site/premises or even a specific operation carried out on one site or certain defined activities, as in the case of local authorities.

- Applicability of the standards to certain situations, particular sectors of business, and management styles.
- Interpretations of various sections of the standard and understanding the requirements of the standards.
- Terminology used.
- Lack of flexibility and perceived restrictions on creativity.
- Lack of relevance to the real needs of the business, resulting in a view that it was bureaucracy gone mad (e.g. paper-shuffling) and a 'why bother' attitude from people at the operating end of the organization.
- The time and resources needed in writing procedures and training and retraining staff in the requirements of the ISO 9000 series and the internal auditing of the system.
- The bureaucracy involved in documentation and accreditation and the lack of mutual recognition of certificated bodies between countries.
- The cost involved in achieving ISO 9001 registration and then maintaining it. This applies, in particular, to small companies. The cost comprises the additional workload incurred by company personnel in writing the procedures, managerial time, increased paperwork, etc., the fee of the management consultancy (if a consultant is used to assist with the process of registration) and the certification body's fees.
- Perceived by small companies to be only applicable to large companies.
- Considered by those companies who have mature TQM approaches to be of no value.
- In some cases, in particular sales/service situations, the rigor and applicability of the standards are perceived as restrictive and as barriers to providing a flexible and responsive service to customers.
- Lack of internal and external audit rigor.

Details are given in the following sources: Association of British Certification Bodies and the NACCB (1994), Batchelor (1992), Brennan (1994), BSI Policy Committee for Small Businesses (1994), Burgess (1998), Campbell (1994), Commerce (1994), Dale and Oakland (1994), Hersan (1990), Jennings (1992), Long et al. (1991), Oliver (1991), Owen (1988), Rayner and Porter (1991), Sayle (1987), Terziovski et al. (1997), and Whittington (1989). Some of these reported difficulties have been eased by the 1994 and 2000 revisions of the ISO 9000 series in terms of clearing up the ambiguity regarding implied requirements, consistency of clause numbering between ISO 9001, ISO 9002 and ISO 9003, process control requirements and the emphasis given to preventative action and the provision of advice for small businesses (e.g. the BSI handbook *ISO 9000 for Small Businesses* (1997)). In addition, a number of the certification bodies have introduced a special service of assessment and surveillance to reduce the cost of ISO 9001 registration to small businesses. The fee structure of such services has been developed to help smaller businesses.

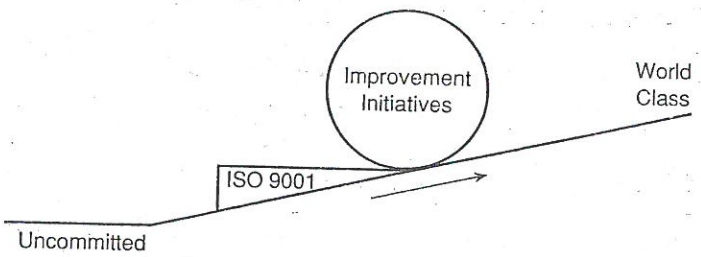

Figure 13.3 Quality improvement and the ISO 9000 series

Seddon (1997) has launched what is almost a one-man crusade against the ISO 9000 series, and his recent book provides some interesting reading of views of what he considers to be the damage inflicted on companies that adopt and implement the requirements of this series of standards.

The revised standards, with their provision for performance improvement; greater emphasis on the involvement of senior management; suitability for all sizes of organizations; increased compatibility with ISO 14001; and user/customer-friendliness, should lead to a reduction in these types of difficulty and criticism; however, only time will tell.

What now follows is an overview of the benefits and limitations of the ISO 9000 series as seen by the author.

- A quality management system is a fundamental pillar in an organization's approach to TQM and it helps to ensure that any improvements made are held in place (see figure 13.3). However, ISO 9001 registration is not a prerequisite of TQM. Some organizations, in particular those from the non-manufacturing sector, have analysed and improved their systems and working practices and have then gone straight to TQM.
- The guidance provided in the requirements of ISO 9001 and ISO 9004, and the independent assessment surveillance, are an indisputable aid in developing and maintaining the procedures, controls and discipline required in a quality management system. This is of particular value for those companies which are just commencing their quality journey. The system should help to ensure that more people within the organization are touched by quality, and in this way quality awareness is raised. However, there is a tendency to encourage the separation of a business into areas that complete the recording of requirements and those areas which do not. For example, functions such as finance, management information systems and human resources are little affected, except for training requirements. It is TQM which stimulates the business by creating the understanding that all its component parts have customers, that waste must be systematically eliminated, and that improvement is a continuous process. To help eradicate these weaknesses

relating to the separation of functions BSI Quality Assurance introduced in 1991 company-wide registration to extend quality system accreditation to the whole of the company (core businesses as well as supporting functions) (see Perry 1991 for details).

Experience indicates that, in most companies, it is not easy to get every function and person involved to take responsibility for their own quality assurance and to make quality improvements in the processes for which they are responsible. The ISO 9000 series of standards, albeit limited in respect of the point made above, can assist in making this happen.

- It is a contractual requirement of many customers that their suppliers are registered to ISO 9001; registration is also required to get on bid lists. Once a company has become registered, it is more than likely that it will ask its suppliers, distributors and providers of service to do the same, setting into motion a chain reaction or what might be classed as a form of pyramid selling. Therefore, in many sectors of industry and government procurement agencies, it is necessary from a marketing viewpoint, and without it a company will simply not get orders. In much of the world it is now a prerequisite condition of doing business and in some sectors of industry (e.g. the automotive industry) the rate of certification is very high. An increasing number of long-standing suppliers to companies have been told by them that they must get ISO 9001 registration to continue to be a supplier. This is in spite of the supplier having been the supplier of choice for a considerable period of time. Once ISO 9001 registration has been achieved an organization may not be able to afford to lose it. Within the European Union, directives (controlling the production and use of most safety-related products, from toys to pressure vessels) call up ISO 9001 as mandatory QA or QC.
- Suppliers have a habit of doing what their customers want and many organizations have achieved ISO 9001 registration to provide documented proof that they have an adequate quality system in place just to satisfy the demands of their major customers. This may not produce the required improvement ethos naturally, and any gains made will be short-lived if registration is perceived as a contractual condition rather than a foundation for ongoing improvement. Some suppliers also use it to demonstrate to customers (actual and potential) that they are committed to quality and have achieved what they often call 'the right level of quality'.
- A system based on the ISO 9000 series provides only the foundation blocks, and registration to ISO 9001 should be viewed as the minimum requirement; the objective should be to develop and improve the system in relation to the needs of the organization. An organization does not achieve superior-performing company status merely by ISO 9001 registration. It is clearly a pre-competitive issue, and separate from the ability to compete, which depends on many other factors. The winners will be those who have

a dedicated commitment to company-wide improvement through continuous self-assessment of what they do.

- The preparation of systems, procedures, working instructions, etc. to meet the requirements of ISO 9001 will have a beneficial effect on a company's performance in terms of improved process yields, reduced levels of non-conformance, improved management control, etc. However, the underlying mechanisms of the ISO 9000 series are such that they will tend towards a steady-state performance. The ISO 9000 series of standards is designed to produce consistency in actions, products and services. An organization can have a consistent performance with a high level of non-conformance. In the words of one executive, 'ISO 9000 is an excellent system for telling us where we have produced rubbish.' The achievement of consistency, while meritorious, leads to a goal which, once achieved, can result in complacency. A consequence of this is that management may pay lip-service to the quality system.
- The question 'Does the quality system reflect the needs of the customer?' should for ever circulate in the minds of senior management.

  Only if there is strong leadership and a written commitment to improvement in the management review of the system will an improvement cycle be triggered. Some organizations have done this by building on and widening their quality systems management review meetings – which deal with issues such as quality audit; corrective and preventative action; production rejections, concessions and corrective actions; waste levels; supplier performance/concessions; customer complaints; and market trends and requirements – into monthly steering meetings for quality improvement. In this way the quality system is integrated into the quality improvement process; it is not uncommon to find they are operated in parallel.
- Having an ISO 9001 certificate of registration does not as a matter of course imply that non-conformities at all stages of the process will not occur, and there is no consensus to suggest that companies working to the same management system generate the same standard of quality. The standard is not prescriptive as to the means of prevention. Detection methods which rely very heavily on inspection techniques, human or mechanical, would appear to satisfy the standard in many aspects. This may be an acknowledgment of the fact that there are many processes where, given the state-of-the-art technology, it is not possible to achieve 'zero defects'. The standard does clearly indicate that corrective and preventative actions and procedures should be established, documented and maintained to prevent recurrence of non-conforming product, and that the system should be maintained and developed through the internal audit and management review, but there is a lack of evidence to suggest that improvement is an explicit criterion by which ongoing registration is monitored. In general, ISO 9001 tends to measure the effectiveness of documentation, paperwork and procedures (the

requisite assessments are often termed a paper chase); this leads to the claim that it encourages bureaucracy and a complex process of documentation.

- Experience indicates that the ISO 9000 series has a limited impact on the total improvement operation of an organization simply because it does not get to the root cause of problems. Most problems are resolved at branch level, and this is a failure in a number of businesses.
- In some quarters there is confusion about the relationship between the ISO 9000 series and TQM. They are not alternatives; a quality system is an essential feature of TQM. However, some organizations see ISO 9001 registration as the pinnacle of their TQM achievements and no plans are laid for building on this registration; a small number of people even believe that improvements driven through internal audits of the ISO 9001 will lead their organization to TQM. As previously mentioned, registration often results in a sense of complacency, in particular after successful third-party assessment of the system.
- It should be obvious from the above discussion that ISO 9001 registration, or for that matter any other quality system registration or certification or approvals, will not prevent a supplier from producing and delivering non-conforming products and/or services to its customers. The standards are a specification for the management of quality; there is a clear distinction between registration and capability, and this fundamental fact needs to be recognized. Product and/or service quality is determined by the individual organization and its people and processes and not by a quality management system standard.
- Many organizations and executives have inflated views of the ISO 9000 series; these are often picked up from the hype generated by those selling advisory services. These views can lead to high expectations of what the standard can achieve which, in the long term, may do it a disservice. The following are typical of the comments (not referenced or attributed to individuals):
  - 'Quality recognition of the ISO 9000 series from a national accredited certification body is prized nationwide because it is known to be difficult to achieve the high standards required by their impartial testing procedures.'
  - 'It will give the car-buying public a guarantee of complete satisfaction or their money back. What it aims to achieve is the world's coveted benchmark of quality: BS 5750. it is a standard that is recognized as being truly superb and is a move that no other rival car maker can afford to ignore.'
  - 'How can it be coveted and difficult to achieve when many thousands of companies in the UK have already met this requirement?'
  - 'Such and such a company is the first in its industrial sector to obtain the prestigious ISO 9001 registration – tremendous achievement, very proud to have achieved to the registration, the most significant event in the company's history, breaking new ground for quality, etc., etc.' (write-up and picture in the local paper).

To the informed what these statements and platitudes are saying is that the organization has taken the first step on the TQM journey.

Summary

A quality management system is one of the key building-blocks for an organization's TQM activities. ISO 9001 and ISO 9004 define and set out a definitive list of features and characteristics which should be present in an organization's quality management system through documented policies, manual and procedures, whatever the product manufactured or offered, or the service provided, or the technology used. In this way sound advice is provided on how an organization may develop a quality system.

In addition to incorporating the clauses of ISO 9001 a quality system design must maximize ownership, allow flexibility without loss of control, and be able to be developed to cope with changes in the business and capture improvements; above all it must be 'user-friendly'.

Seeking registration for the wrong reasons and a system which is too inflexible and bureaucratic are some of the major pitfalls. Assessment to ISO 9001 may improve an organization's systems, procedures and processes but on its own will not deliver continuous and company-wide improvement. To make best use of the ISO 9000 series it is important that the implementation is carried out in the right spirit and for the right reasons. This is an area in which management commitment is vital. The solution to many of the reported difficulties, shortcomings and criticisms of the standard lies in the hands of an organization's senior management team. The saying 'You only get out what you put in' is so relevant to the ISO 9000 series and it is so important that the system is seen as being alive. All too often the ISO 9001 system is left solely in the hands of the quality department, often just one individual.

Registration to ISO 9001 is not the only way to achieve quality assurance, neither is it a prerequisite for TQM. It is, however, sometimes necessary to have the appropriate registration in order to do business at both a national and an international level, and in this respect it is a key marketing tool. It is the fear of loss of business and substitution in the marketplace that has caused many organizations to obtain ISO 9001 registration. The ISO 9000 series provides a common benchmark for good-quality management system practice which is recognized throughout the world. An organization which is registered to ISO 9001:2000 should be working in an organized, structured and procedural way with defined methods of operating. It is important that organizations do not view ISO 9001 registration as their pinnacle of success in relation to quality assurance and quality management. It only provides the basic foundation blocks, and they must have strategies and business plans in place to move on and cater for

areas which are not addressed by the standard and develop to TQM. This is particularly important in smaller businesses which, in a number of cases, attain ISO 9001 registration and have no interest in or vision of developing further their quality management activities.

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Chapter Fourteen

Integrated Management Systems

G. Wilkinson and B. G. Dale

Introduction

The need to assure customers that products and services satisfy requirements for quality has led to the introduction of quality management systems (QMS), and registration to QMS standards, such as ISO 9001 (1994 and 2000), has become the norm for many organizations. However, responsible organizations have also to be concerned about the well-being of their employees, their working environment, the impact of operations on the local community, and the long-term effects of their products while in use and after they have been discarded. They cannot ignore legislation such as the Environmental Protection Act 1990, the Health and Safety at Work Act 1974 and the Control of Substances Hazardous to Health Regulations 1988, where failure to have effective management systems in place can lead to heavy fines, a prison sentence, loss of operating license or even plant closure. Customers, employees, shareholders and the community are also concerned about these matters. In addition to benefits, such as less waste, lower energy costs and reduced absence and employee turnover levels, creating an 'image' that meets customer expectations can help an organization improve market share. This has led to the introduction of EMAS, the European Commission's Eco-Management and Audit Scheme (European Commission 1993); ISO 14001 (1996) – the specification for environmental management systems (EMS); and BS 8800 (1996) and BSI-OHSAS18001 (1999) – guides/specifications for occupational health and safety management systems (OH&SMS). Dealing with separate management systems covering quality, environmental, and health and safety issues, and ensuring that they align with the organization's strategy, has not proved easy, however, and from the mid-1990s, an integrated management system (IMS) addressing these three areas of management has come to be of interest to business. Research studies by Riemann and Sharratt (1995), Hillary (1997) and Wilkinson and Dale (1998, 1999), and survey results examined by Daniel (2001), show increasing interest by companies in integration, and an IMS is now seen as part of the organization's management portfolio. Although the

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Quality management systems — Requirements

Systèmes de management de la qualité — Exigences

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CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is Technical Committee ISO/TC 176, *Quality management and quality assurance*, Subcommittee SC 2, *Quality systems*.

This fifth edition cancels and replaces the fourth edition (ISO 9001:2008), which has been technically revised, through the adoption of a revised clause sequence and the adaptation of the revised quality management principles and of new concepts. It also cancels and replaces the Technical Corrigendum ISO 9001:2008/Cor.1:2009.

a thing to be corrected, typically an error in a printed book.

https://asq.org/quality-resources/quality-management-system#Benefits

Each element of a quality management system helps achieve the overall goals of meeting the customers' and organization's requirements. Quality management systems should address an organization's unique needs; however, the elements all systems have in common include:

The organization's quality policy and quality objectives
Quality manual
Procedures, instructions, and records
Data management
Internal processes
Customer satisfaction from product quality
Improvement opportunities
Quality analysis

A quality management system (QMS) is defined as a formalized system that documents processes, procedures, and responsibilities for achieving quality policies and objectives. A QMS helps coordinate and direct an organization's activities to meet customer and regulatory requirements and improve its effectiveness and efficiency on a continuous basis.

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A quality management system (QMS) is a collection of business processes and procedures which aims to ensure that the quality of products or services meets - or exceeds - customer expectations.

file:///C:/Users/user/OneDrive%20-%20University%20Of%20Jordan/1st%202023-2024/Quality%20Management/ISO%20files%20and%20standards/BS%20ISO%2031000-2018.pdf

Introduction

0.1 General

The adoption of a quality management system is a strategic decision for an organization that can help to improve its overall performance and provide a sound basis for sustainable development initiatives.

The potential benefits to an organization of implementing a quality management system based on this International Standard are:

a) the ability to consistently provide products and services that meet customer and applicable statutory and regulatory requirements;

b) facilitating opportunities to enhance customer satisfaction;

c) addressing risks and opportunities associated with its context and objectives;

d) the ability to demonstrate conformity to specified quality management system requirements.

This International Standard can be used by internal and external parties.

It is not the intent of this International Standard to imply the need for:

— uniformity in the structure of different quality management systems;

— alignment of documentation to the clause structure of this International Standard;

— the use of the specific terminology of this International Standard within the organization.

The quality management system requirements specified in this International Standard are complementary to requirements for products and services.

This International Standard employs the process approach, which incorporates the Plan-Do-Check-Act (PDCA) cycle and risk-based thinking.

The process approach enables an organization to plan its processes and their interactions.

The PDCA cycle enables an organization to ensure that its processes are adequately resourced and managed, and that opportunities for improvement are determined and acted on.

Risk-based thinking enables an organization to determine the factors that could cause its processes and its quality management system to deviate from the planned results, to put in place preventive controls to minimize negative effects and to make maximum use of opportunities as they arise (see Clause A.4).

Consistently meeting requirements and addressing future needs and expectations poses a challenge for organizations in an increasingly dynamic and complex environment. To achieve this objective, the organization might find it necessary to adopt various forms of improvement in addition to correction and continual improvement, such as breakthrough change, innovation and re-organization.

In this International Standard, the following verbal forms are used:

— "shall" indicates a requirement;

— "should" indicates a recommendation;

— "may" indicates a permission;

— "can" indicates a possibility or a capability.

Information marked as "NOTE" is for guidance in understanding or clarifying the associated requirement.

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The iPhone One of the latest examples of breakthrough innovation on the tech front is the first iPhone. By harnessing new technology, Apple was able to bring a fundamentally new product to market, creating new demand in the process.

Blippar Another great example of breakthrough innovation on the techn

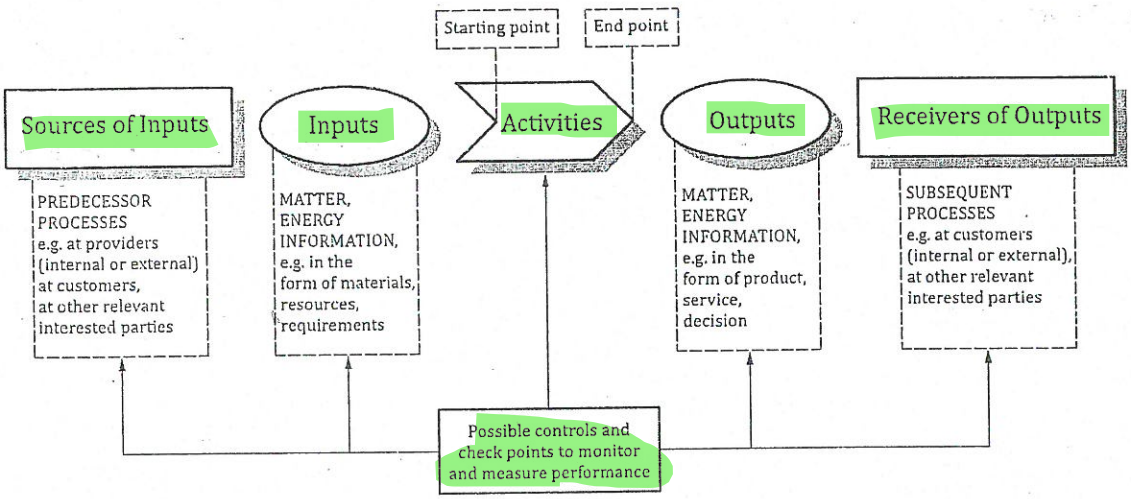
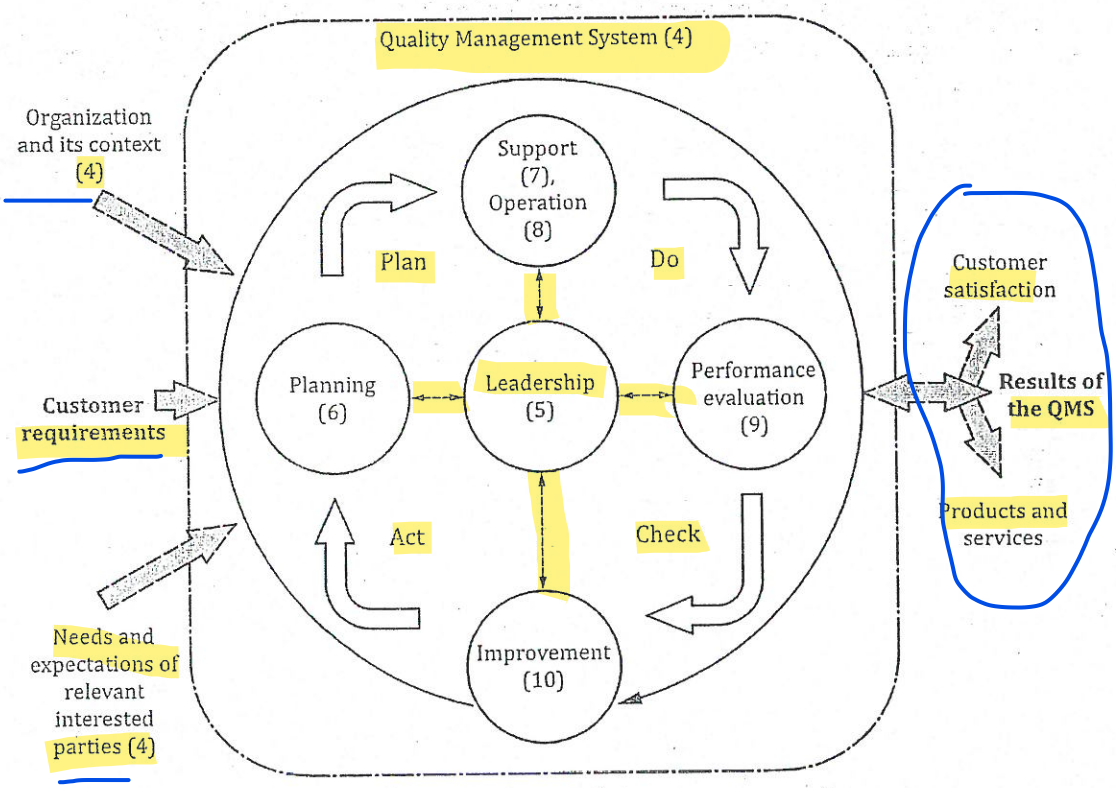


Figure 1 — Schematic representation of the elements of a single process

0.3.2 Plan-Do-Check-Act cycle

The PDCA cycle can be applied to all processes and to the quality management system as a whole. Figure 2 illustrates how Clauses 4 to 10 can be grouped in relation to the PDCA cycle.



NOTE Numbers in brackets refer to the clauses in this International Standard.

Figure 2 — Representation of the structure of this International Standard in the PDCA cycle

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0.2 Quality management principles

This International Standard is based on the quality management principles described in ISO 9000. The descriptions include a statement of each principle, a rationale of why the principle is important for the organization, some examples of benefits associated with the principle and examples of typical actions to improve the organization's performance when applying the principle.

The quality management principles are:

— customer focus;

— leadership;

— engagement of people;

— process approach;

— improvement;

— evidence-based decision making;

— relationship management.

https://asq.org/quality-resources/iso-9000

Particular focus on CS and CRM

0.3 Process approach

0.3.1 General

This International Standard promotes the adoption of a process approach when developing, implementing and improving the effectiveness of a quality management system, to enhance customer satisfaction by meeting customer requirements. Specific requirements considered essential to the adoption of a process approach are included in 4.4.

Understanding and managing interrelated processes as a system contributes to the organization's effectiveness and efficiency in achieving its intended results. This approach enables the organization to control the interrelationships and interdependencies among the processes of the system, so that the overall performance of the organization can be enhanced.

The process approach involves the systematic definition and management of processes, and their interactions, so as to achieve the intended results in accordance with the quality policy and strategic direction of the organization. Management of the processes and the system as a whole can be achieved using the PDCA cycle (see 0.3.2) with an overall focus on risk-based thinking (see 0.3.3) aimed at taking advantage of opportunities and preventing undesirable results.

The application of the process approach in a quality management system enables:

a) understanding and consistency in meeting requirements;

b) the consideration of processes in terms of added value;

c) the achievement of effective process performance;

d) improvement of processes based on evaluation of data and information.

Figure 1 gives a schematic representation of any process and shows the interaction of its elements. The monitoring and measuring check points, which are necessary for control, are specific to each process and will vary depending on the related risks.

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A risk is something unplanned that might happen that could have a negative impact on your project;
An issue is something that is currently happening and is having a negative impact on your project;
An opportunity is something unplanned that might happen that you could exploit to have a positive impact on your project.

The PDCA cycle can be briefly described as follows:

— **Plan**: establish the objectives of the system and its processes, and the resources needed to deliver results in accordance with customers' requirements and the organization's policies, and identify and address risks and opportunities;

— **Do**: implement what was planned;

— **Check**: monitor and (where applicable) measure processes and the resulting products and services against policies, objectives, requirements and planned activities, and report the results;

— **Act**: take actions to improve performance, as necessary.

0.3.3 Risk-based thinking

Risk-based thinking (see Clause A.4) is essential for achieving an effective quality management system. The concept of risk-based thinking has been implicit in previous editions of this International Standard including, for example, carrying out preventive action to eliminate potential nonconformities, analysing any nonconformities that do occur, and taking action to prevent recurrence that is appropriate for the effects of the nonconformity.

To conform to the requirements of this International Standard, an organization needs to plan and implement actions to address risks and opportunities. Addressing both risks and opportunities establishes a basis for increasing the effectiveness of the quality management system, achieving improved results and preventing negative effects.

Opportunities can arise as a result of a situation favourable to achieving an intended result, for example, a set of circumstances that allow the organization to attract customers, develop new products and services, reduce waste or improve productivity. Actions to address opportunities can also include consideration of associated risks. Risk is the effect of uncertainty and any such uncertainty can have positive or negative effects. A positive deviation arising from a risk can provide an opportunity, but not all positive effects of risk result in opportunities.

0.4 Relationship with other management system standards

This International Standard applies the framework developed by ISO to improve alignment among its International Standards for management systems (see Clause A.1).

This International Standard enables an organization to use the process approach, coupled with the PDCA cycle and risk-based thinking, to align or integrate its quality management system with the requirements of other management system standards.

This International Standard relates to ISO 9000 and ISO 9004 as follows:

9000:2015

— ISO 9000 *Quality management systems — Fundamentals and vocabulary* provides essential background for the proper understanding and implementation of this International Standard;

9001:2015

— ISO 9004 *Managing for the sustained success of an organization — A quality management approach* provides guidance for organizations that choose to progress beyond the requirements of this International Standard.

9002:2016

Annex B provides details of other International Standards on quality management and quality management systems that have been developed by ISO/TC 176.

9004:2018

This International Standard does not include requirements specific to other management systems, such as those for environmental management, occupational health and safety management, or financial management.

19011:2018

Sector-specific quality management system standards based on the requirements of this International Standard have been developed for a number of sectors. Some of these standards specify additional quality management system requirements, while others are limited to providing guidance to the application of this International Standard within the particular sector.

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A matrix showing the correlation between the clauses of this edition of this International Standard and the previous edition (ISO 9001:2008) can be found on the ISO/TC 176/SC 2 open access web site at: www.iso.org/tc176/sc02/public.

Definition of Strategy
Strategy is a game plan, chosen to achieve the organizational objectives, gain customer's trust, attain competitive advantage and to acquire a market position. It is a combination of well thought intent and actions which lead to the organization towards its desired position or destination. It is a unified and integrated plan made to achieve the basic objectives of the enterprise like:

Effectiveness
Handling events and problems
Taking advantage of opportunities
Full resource utilization
Coping with threats
Strategy is a combination of flexibly designed corporate moves, through which an organization can compete with its rivals successfully. The following are the features of the Strategy:

It should be formulated from the top level management, however, sub-strategies can be made by middle level management.
It should have a long range perspective.
It should be dynamic in nature.
The main purpose is to overcome from uncertain situations.
It should be made in such a way, to make the best possible use of scarce resources.
Definition of Policy
The policy is also regarded as a mini – mission statement, is a set of principles and rules which directs the decisions of the organization. Policies are framed by the top level management of the organization to serve as a guideline for operational decision making. It is helpful in highlighting the rules, value and beliefs of the organization. In addition to this, it acts as a basis for guiding the actions.

Policies are designed, by taking opinion and general view of a number of people in the organization regarding any situation. They are made from the past experience and basic understanding. In this way, the people who comes under the range of such policy will completely agree upon its implementation.

Policies helps the management of an organization to determine what is to be done, in a particular situation. These have to be consistently applied over a long period of time to avoid discrepancies and overlapping.

Key Differences Between Strategy and Policy

The following are the major differences between strategy and policy

Strategy is the best plan opted from a number of plans, in order to achieve the organizational goals and objectives. Policy is a set of common rules and regulations, which forms as a base to take day to day decisions.
Strategy is a plan of action while the policy is a principle of action.
Strategies can be modified as per the situation, so they are dynamic in nature. Conversely, Policies are uniform in nature, however relaxations can be made for unexpected situations.
Strategies are concentrated toward actions, whereas Policies are decision oriented.
Strategies are always framed by the top management but sub strategies are formulated at the middle level. In contrast to Policy, they are, in general made by the top management.
Strategies deals with external environmental factors. On the other hand, Policies are made for internal environment of business.

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Quality management systems — Requirements

1 Scope

This International Standard specifies requirements for a quality management system when an organization:

a) needs to demonstrate its ability to consistently provide products and services that meet customer and applicable statutory and regulatory requirements, and

b) aims to enhance customer satisfaction through the effective application of the system, including processes for improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements.

All the requirements of this International Standard are generic and are intended to be applicable to any organization, regardless of its type or size, or the products and services it provides.

NOTE 1 In this International Standard, the terms "product" or "service" only apply to products and services intended for, or required by, a customer.

NOTE 2 Statutory and regulatory requirements can be expressed as legal requirements.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9000:2015, *Quality management systems — Fundamentals and vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9000:2015 apply.

4 Context of the organization

4.1 Understanding the organization and its context

The organization shall determine external and internal issues that are relevant to its purpose and its strategic direction and that affect its ability to achieve the intended result(s) of its quality management system.

The organization shall monitor and review information about these external and internal issues.

NOTE 1 Issues can include positive and negative factors or conditions for consideration.

NOTE 2 Understanding the external context can be facilitated by considering issues arising from legal, technological, competitive, market, cultural, social and economic environments, whether international, national, regional or local.

NOTE 3 Understanding the internal context can be facilitated by considering issues related to values, culture, knowledge and performance of the organization.

At the strategic level, tools such as Strengths, Weaknesses, Opportunities and Threats analysis (SWOT) and Political, Economic, Social, Technological, Legal, Environmental analysis (PESTLE) can be used.

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4.2 Understanding the needs and expectations of interested parties

Due to their effect or potential effect on the organization's ability to consistently provide products and services that meet customer and applicable statutory and regulatory requirements, the organization shall determine:

a) the interested parties that are relevant to the quality management system;

b) the requirements of these interested parties that are relevant to the quality management system.

The organization shall monitor and review information about these interested parties and their relevant requirements.

4.3 Determining the scope of the quality management system

The organization shall determine the boundaries and applicability of the quality management system to establish its scope.

When determining this scope, the organization shall consider:

a) the external and internal issues referred to in 4.1;

b) the requirements of relevant interested parties referred to in 4.2;

c) the products and services of the organization.

The organization shall apply all the requirements of this International Standard if they are applicable within the determined scope of its quality management system.

The scope of the organization's quality management system shall be available and be maintained as documented information. The scope shall state the types of products and services covered, and provide justification for any requirement of this International Standard that the organization determines is not applicable to the scope of its quality management system.

Conformity to this International Standard may only be claimed if the requirements determined as not being applicable do not affect the organization's ability or responsibility to ensure the conformity of its products and services and the enhancement of customer satisfaction.

4.4 Quality management system and its processes

4.4.1 The organization shall establish, implement, maintain and continually improve a quality management system, including the processes needed and their interactions, in accordance with the requirements of this International Standard.

The organization shall determine the processes needed for the quality management system and their application throughout the organization, and shall:

a) determine the inputs required and the outputs expected from these processes;

b) determine the sequence and interaction of these processes;

c) determine and apply the criteria and methods (including monitoring, measurements and related performance indicators) needed to ensure the effective operation and control of these processes;

d) determine the resources needed for these processes and ensure their availability;

e) assign the responsibilities and authorities for these processes;

f) address the risks and opportunities as determined in accordance with the requirements of 6.1;

g) evaluate these processes and implement any changes needed to ensure that these processes achieve their intended results;

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h) improve the processes and the quality management system.

4.4.2 To the extent necessary, the organization shall:

a) maintain documented information to support the operation of its processes;

b) retain documented information to have confidence that the processes are being carried out as planned.

5 Leadership

5.1 Leadership and commitment

5.1.1 General

Top management shall demonstrate leadership and commitment with respect to the quality management system by:

a) taking accountability for the effectiveness of the quality management system;

b) ensuring that the quality policy and quality objectives are established for the quality management system and are compatible with the context and strategic direction of the organization;

c) ensuring the integration of the quality management system requirements into the organization's business processes;

d) promoting the use of the process approach and risk-based thinking;

e) ensuring that the resources needed for the quality management system are available;

f) communicating the importance of effective quality management and of conforming to the quality management system requirements;

g) ensuring that the quality management system achieves its intended results;

h) engaging, directing and supporting persons to contribute to the effectiveness of the quality management system;

i) promoting improvement;

j) supporting other relevant management roles to demonstrate their leadership as it applies to their areas of responsibility.

NOTE Reference to "business" in this International Standard can be interpreted broadly to mean those activities that are core to the purposes of the organization's existence, whether the organization is public, private, for profit or not for profit.

5.1.2 Customer focus

Top management shall demonstrate leadership and commitment with respect to customer focus by ensuring that:

a) customer and applicable statutory and regulatory requirements are determined, understood and consistently met;

b) the risks and opportunities that can affect conformity of products and services and the ability to enhance customer satisfaction are determined and addressed;

c) the focus on enhancing customer satisfaction is maintained.

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5.2 Policy

5.2.1 Establishing the quality policy

Top management shall establish, implement and maintain a quality policy that:

a) is appropriate to the purpose and context of the organization and supports its strategic direction;

b) provides a framework for setting quality objectives;

c) includes a commitment to satisfy applicable requirements;

d) includes a commitment to continual improvement of the quality management system.

5.2.2 Communicating the quality policy

The quality policy shall:

a) be available and be maintained as documented information;

b) be communicated, understood and applied within the organization;

c) be available to relevant interested parties, as appropriate.

5.3 Organizational roles, responsibilities and authorities

Top management shall ensure that the responsibilities and authorities for relevant roles are assigned, communicated and understood within the organization.

Top management shall assign the responsibility and authority for:

a) ensuring that the quality management system conforms to the requirements of this International Standard;

b) ensuring that the processes are delivering their intended outputs;

c) reporting on the performance of the quality management system and on opportunities for improvement (see 10.1), in particular to top management;

d) ensuring the promotion of customer focus throughout the organization;

e) ensuring that the integrity of the quality management system is maintained when changes to the quality management system are planned and implemented.

6 Planning

6.1 Actions to address risks and opportunities

6.1.1 When planning for the quality management system, the organization shall consider the issues referred to in 4.1 and the requirements referred to in 4.2 and determine the risks and opportunities that need to be addressed to:

a) give assurance that the quality management system can achieve its intended result(s);

b) enhance desirable effects;

c) prevent, or reduce, undesired effects;

d) achieve improvement.

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6.1.2 The organization shall plan:

a) actions to address these risks and opportunities;

b) how to:

1) integrate and implement the actions into its quality management system processes (see 4.4);

2) evaluate the effectiveness of these actions.

Actions taken to address risks and opportunities shall be proportionate to the potential impact on the conformity of products and services.

NOTE 1 Options to address risks can include avoiding risk, taking risk in order to pursue an opportunity, eliminating the risk source, changing the likelihood or consequences, sharing the risk, or retaining risk by informed decision.

Risk is usually expressed in terms of risk sources (3.4), potential events (3.5), their consequences (3.6) and their likelihood (3.7).

NOTE 2 Opportunities can lead to the adoption of new practices, launching new products, opening new markets, addressing new customers, building partnerships, using new technology and other desirable and viable possibilities to address the organization's or its customers' needs.

6.2 Quality objectives and planning to achieve them

6.2.1 The organization shall establish quality objectives at relevant functions, levels and processes needed for the quality management system.

Unlike "Risk Avoidance", the process or activity is not eliminated. Rather, the risk of an incident or adverse event associated to a process is removed by getting rid of a hazard or hazardous condition.

The quality objectives shall:

a) be consistent with the quality policy;

b) be measurable;

c) take into account applicable requirements;

d) be relevant to conformity of products and services and to enhancement of customer satisfaction;

e) be monitored;

f) be communicated;

g) be updated as appropriate.

The organization shall maintain documented information on the quality objectives.

6.2.2 When planning how to achieve its quality objectives, the organization shall determine:

a) what will be done;

b) what resources will be required;

c) who will be responsible;

d) when it will be completed;

e) how the results will be evaluated.

6.3 Planning of changes

When the organization determines the need for changes to the quality management system, the changes shall be carried out in a planned manner (see 4.4).

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The organization shall consider:

a) the purpose of the changes and their potential consequences;

b) the integrity of the quality management system;

c) the availability of resources;

d) the allocation or reallocation of responsibilities and authorities.

7 Support

7.1 Resources

7.1.1 General

The organization shall determine and provide the resources needed for the establishment, implementation, maintenance and continual improvement of the quality management system.

The organization shall consider:

a) the capabilities of, and constraints on, existing internal resources;

b) what needs to be obtained from external providers.

7.1.2 People

The organization shall determine and provide the persons necessary for the effective implementation of its quality management system and for the operation and control of its processes.

7.1.3 Infrastructure

The organization shall determine, provide and maintain the infrastructure necessary for the operation of its processes and to achieve conformity of products and services.

NOTE Infrastructure can include:

a) buildings and associated utilities;

b) equipment, including hardware and software;

c) transportation resources;

d) information and communication technology.

7.1.4 Environment for the operation of processes

The organization shall determine, provide and maintain the environment necessary for the operation of its processes and to achieve conformity of products and services.

NOTE A suitable environment can be a combination of human and physical factors, such as:

a) social (e.g. non-discriminatory, calm, non-confrontational);

b) psychological (e.g. stress-reducing, burnout prevention, emotionally protective);

c) physical (e.g. temperature, heat, humidity, light, airflow, hygiene, noise).

These factors can differ substantially depending on the products and services provided.

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7.1.5 Monitoring and measuring resources

7.1.5.1 General

The organization shall determine and provide the resources needed to ensure valid and reliable results when monitoring or measuring is used to verify the conformity of products and services to requirements.

The organization shall ensure that the resources provided:

a) are suitable for the specific type of monitoring and measurement activities being undertaken;

b) are maintained to ensure their continuing fitness for their purpose.

The organization shall retain appropriate documented information as evidence of fitness for purpose of the monitoring and measurement resources.

7.1.5.2 Measurement traceability

When measurement traceability is a requirement, or is considered by the organization to be an essential part of providing confidence in the validity of measurement results, measuring equipment shall be:

a) calibrated or verified, or both, at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards; when no such standards exist, the basis used for calibration or verification shall be retained as documented information;

b) identified in order to determine their status;

c) safeguarded from adjustments, damage or deterioration that would invalidate the calibration status and subsequent measurement results.

The organization shall determine if the validity of previous measurement results has been adversely affected when measuring equipment is found to be unfit for its intended purpose, and shall take appropriate action as necessary.

7.1.6 Organizational knowledge

The organization shall determine the knowledge necessary for the operation of its processes and to achieve conformity of products and services.

This knowledge shall be maintained and be made available to the extent necessary.

When addressing changing needs and trends, the organization shall consider its current knowledge and determine how to acquire or access any necessary additional knowledge and required updates.

NOTE 1 Organizational knowledge is knowledge specific to the organization; it is generally gained by experience. It is information that is used and shared to achieve the organization's objectives.

NOTE 2 Organizational knowledge can be based on:

a) internal sources (e.g. intellectual property; knowledge gained from experience; lessons learned from failures and successful projects; capturing and sharing undocumented knowledge and experience; the results of improvements in processes, products and services);

b) external sources (e.g. standards; academia; conferences; gathering knowledge from customers or external providers).

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7.2 Competence

The organization shall:

a) determine the necessary competence of person(s) doing work under its control that affects the performance and effectiveness of the quality management system;

b) ensure that these persons are competent on the basis of appropriate education, training, or experience;

c) where applicable, take actions to acquire the necessary competence, and evaluate the effectiveness of the actions taken;

d) retain appropriate documented information as evidence of competence.

NOTE Applicable actions can include, for example, the provision of training to, the mentoring of, or the re-assignment of currently employed persons; or the hiring or contracting of competent persons.

7.3 Awareness

The organization shall ensure that persons doing work under the organization's control are aware of:

a) the quality policy;

b) relevant quality objectives;

c) their contribution to the effectiveness of the quality management system, including the benefits of improved performance;

d) the implications of not conforming with the quality management system requirements.

7.4 Communication

The organization shall determine the internal and external communications relevant to the quality management system, including:

a) on what it will communicate;

b) when to communicate;

c) with whom to communicate;

d) how to communicate;

e) who communicates.

7.5 Documented information

7.5.1 General

The organization's quality management system shall include:

a) documented information required by this International Standard;

b) documented information determined by the organization as being necessary for the effectiveness of the quality management system.

NOTE The extent of documented information for a quality management system can differ from one organization to another due to:

— the size of organization and its type of activities, processes, products and services;

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Document : maintained

Records : retained

— the complexity of processes and their interactions;

— the competence of persons.

7.5.2 Creating and updating

When creating and updating documented information, the organization shall ensure appropriate:

a) identification and description (e.g. a title, date, author, or reference number);

b) format (e.g. language, software version, graphics) and media (e.g. paper, electronic);

c) review and approval for suitability and adequacy.

7.5.3 Control of documented information

7.5.3.1 Documented information required by the quality management system and by this International Standard shall be controlled to ensure:

a) it is available and suitable for use, where and when it is needed;

b) it is adequately protected (e.g. from loss of confidentiality, improper use, or loss of integrity).

7.5.3.2 For the control of documented information, the organization shall address the following activities, as applicable:

a) distribution, access, retrieval and use;

b) storage and preservation, including preservation of legibility;

c) control of changes (e.g. version control);

d) retention and disposition.

Documented information of external origin determined by the organization to be necessary for the planning and operation of the quality management system shall be identified as appropriate, and be controlled.

Documented information retained as evidence of conformity shall be protected from unintended alterations.

NOTE Access can imply a decision regarding the permission to view the documented information only, or the permission and authority to view and change the documented information.

8 Operation

8.1 Operational planning and control

The organization shall plan, implement and control the processes (see 4.4) needed to meet the requirements for the provision of products and services, and to implement the actions determined in Clause 6, by:

a) determining the requirements for the products and services;

b) establishing criteria for:

1) the processes;

2) the acceptance of products and services;

c) determining the resources needed to achieve conformity to the product and service requirements;

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d) implementing control of the processes in accordance with the criteria;

e) determining, maintaining and retaining documented information to the extent necessary:

1) to have confidence that the processes have been carried out as planned;

2) to demonstrate the conformity of products and services to their requirements.

The output of this planning shall be suitable for the organization's operations.

The organization shall control planned changes and review the consequences of unintended changes, taking action to mitigate any adverse effects, as necessary.

The organization shall ensure that outsourced processes are controlled (see 8.4).

8.2 Requirements for products and services

8.2.1 Customer communication

Communication with customers shall include:

a) providing information relating to products and services;

b) handling enquiries, contracts or orders, including changes;

c) obtaining customer feedback relating to products and services, including customer complaints;

d) handling or controlling customer property;

e) establishing specific requirements for contingency actions, when relevant.

8.2.2 Determining the requirements for products and services

When determining the requirements for the products and services to be offered to customers, the organization shall ensure that:

a) the requirements for the products and services are defined, including:

1) any applicable statutory and regulatory requirements;

2) those considered necessary by the organization;

b) the organization can meet the claims for the products and services it offers.

8.2.3 Review of the requirements for products and services

8.2.3.1 The organization shall ensure that it has the ability to meet the requirements for products and services to be offered to customers. The organization shall conduct a review before committing to supply products and services to a customer, to include:

a) requirements specified by the customer, including the requirements for delivery and post-delivery activities;

b) requirements not stated by the customer, but necessary for the specified or intended use, when known;

c) requirements specified by the organization;

d) statutory and regulatory requirements applicable to the products and services;

e) contract or order requirements differing from those previously expressed.

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The organization shall ensure that contract or order requirements differing from those previously defined are resolved.

The customer's requirements shall be confirmed by the organization before acceptance, when the customer does not provide a documented statement of their requirements.

NOTE In some situations, such as internet sales, a formal review is impractical for each order. Instead, the review can cover relevant product information, such as catalogues.

8.2.3.2 The organization shall retain documented information, as applicable:

a) on the results of the review;

b) on any new requirements for the products and services.

8.2.4 Changes to requirements for products and services

The organization shall ensure that relevant documented information is amended, and that relevant persons are made aware of the changed requirements, when the requirements for products and services are changed.

8.3 Design and development of products and services

8.3.1 General

The organization shall establish, implement and maintain a design and development process that is appropriate to ensure the subsequent provision of products and services.

8.3.2 Design and development planning

In determining the stages and controls for design and development, the organization shall consider:

a) the nature, duration and complexity of the design and development activities;

b) the required process stages, including applicable design and development reviews;

c) the required design and development verification and validation activities;

d) the responsibilities and authorities involved in the design and development process;

e) the internal and external resource needs for the design and development of products and services;

f) the need to control interfaces between persons involved in the design and development process;

g) the need for involvement of customers and users in the design and development process;

h) the requirements for subsequent provision of products and services;

i) the level of control expected for the design and development process by customers and other relevant interested parties;

j) the documented information needed to demonstrate that design and development requirements have been met.

8.3.3 Design and development inputs

The organization shall determine the requirements essential for the specific types of products and services to be designed and developed. The organization shall consider:

a) functional and performance requirements;

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b) information derived from previous similar design and development activities;

c) statutory and regulatory requirements;

d) standards or codes of practice that the organization has committed to implement;

e) potential consequences of failure due to the nature of the products and services.

Inputs shall be adequate for design and development purposes, complete and unambiguous.

Conflicting design and development inputs shall be resolved.

The organization shall retain documented information on design and development inputs.

8.3.4 Design and development controls

The organization shall apply controls to the design and development process to ensure that:

a) the results to be achieved are defined;

b) reviews are conducted to evaluate the ability of the results of design and development to meet requirements;

c) verification activities are conducted to ensure that the design and development outputs meet the input requirements;

d) validation activities are conducted to ensure that the resulting products and services meet the requirements for the specified application or intended use;

e) any necessary actions are taken on problems determined during the reviews, or verification and validation activities;

f) documented information of these activities is retained.

NOTE Design and development reviews, verification and validation have distinct purposes. They can be conducted separately or in any combination, as is suitable for the products and services of the organization.

8.3.5 Design and development outputs

The organization shall ensure that design and development outputs:

a) meet the input requirements;

b) are adequate for the subsequent processes for the provision of products and services;

c) include or reference monitoring and measuring requirements, as appropriate, and acceptance criteria;

d) specify the characteristics of the products and services that are essential for their intended purpose and their safe and proper provision.

The organization shall retain documented information on design and development outputs.

8.3.6 Design and development changes

The organization shall identify, review and control changes made during, or subsequent to, the design and development of products and services, to the extent necessary to ensure that there is no adverse impact on conformity to requirements.

The organization shall retain documented information on:

a) design and development changes;

b) the results of reviews;

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c) the authorization of the changes;

d) the actions taken to prevent adverse impacts.

8.4 Control of externally provided processes, products and services

8.4.1 General

The organization shall ensure that externally provided processes, products and services conform to requirements.

The organization shall determine the controls to be applied to externally provided processes, products and services when:

a) products and services from external providers are intended for incorporation into the organization's own products and services;

b) products and services are provided directly to the customer(s) by external providers on behalf of the organization;

c) a process, or part of a process, is provided by an external provider as a result of a decision by the organization.

The organization shall determine and apply criteria for the evaluation, selection, monitoring of performance, and re-evaluation of external providers, based on their ability to provide processes or products and services in accordance with requirements. The organization shall retain documented information of these activities and any necessary actions arising from the evaluations.

8.4.2 Type and extent of control

The organization shall ensure that externally provided processes, products and services do not adversely affect the organization's ability to consistently deliver conforming products and services to its customers.

The organization shall:

a) ensure that externally provided processes remain within the control of its quality management system;

b) define both the controls that it intends to apply to an external provider and those it intends to apply to the resulting output;

c) take into consideration:

   1) the potential impact of the externally provided processes, products and services on the organization's ability to consistently meet customer and applicable statutory and regulatory requirements;

   2) the effectiveness of the controls applied by the external provider;

d) determine the verification, or other activities, necessary to ensure that the externally provided processes, products and services meet requirements.

8.4.3 Information for external providers

The organization shall ensure the adequacy of requirements prior to their communication to the external provider.

The organization shall communicate to external providers its requirements for:

a) the processes, products and services to be provided;

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b) the approval of:

   1) products and services;

   2) methods, processes and equipment;

   3) the release of products and services;

c) competence, including any required qualification of persons;

d) the external providers' interactions with the organization;

e) control and monitoring of the external providers' performance to be applied by the organization;

f) verification or validation activities that the organization, or its customer, intends to perform at the external providers' premises.

8.5 Production and service provision

8.5.1 Control of production and service provision

The organization shall implement production and service provision under controlled conditions.

Controlled conditions shall include, as applicable:

a) the availability of documented information that defines:

   1) the characteristics of the products to be produced, the services to be provided, or the activities to be performed;

   2) the results to be achieved;

b) the availability and use of suitable monitoring and measuring resources;

c) the implementation of monitoring and measurement activities at appropriate stages to verify that criteria for control of processes or outputs, and acceptance criteria for products and services, have been met;

d) the use of suitable infrastructure and environment for the operation of processes;

e) the appointment of competent persons, including any required qualification;

f) the validation, and periodic revalidation, of the ability to achieve planned results of the processes for production and service provision, where the resulting output cannot be verified by subsequent monitoring or measurement;

g) the implementation of actions to prevent human error;

h) the implementation of release, delivery and post-delivery activities.

8.5.2 Identification and traceability

The organization shall use suitable means to identify outputs when it is necessary to ensure the conformity of products and services.

The organization shall identify the status of outputs with respect to monitoring and measurement requirements throughout production and service provision.

The organization shall control the unique identification of the outputs when traceability is a requirement, and shall retain the documented information necessary to enable traceability.

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8.5.3 Property belonging to customers or external providers

The organization shall exercise care with property belonging to customers or external providers while it is under the organization's control or being used by the organization.

The organization shall identify, verify, protect and safeguard customers' or external providers' property provided for use or incorporation into the products and services.

When the property of a customer or external provider is lost, damaged or otherwise found to be unsuitable for use, the organization shall report this to the customer or external provider and retain documented information on what has occurred.

NOTE A customer's or external provider's property can include materials, components, tools and equipment, premises, intellectual property and personal data.

8.5.4 Preservation

The organization shall preserve the outputs during production and service provision, to the extent necessary to ensure conformity to requirements.

NOTE Preservation can include identification, handling, contamination control, packaging, storage, transmission or transportation, and protection.

8.5.5 Post-delivery activities

The organization shall meet requirements for post-delivery activities associated with the products and services.

In determining the extent of post-delivery activities that are required, the organization shall consider:

a) statutory and regulatory requirements;

b) the potential undesired consequences associated with its products and services;

c) the nature, use and intended lifetime of its products and services;

d) customer requirements;

e) customer feedback.

NOTE Post-delivery activities can include actions under warranty provisions, contractual obligations such as maintenance services, and supplementary services such as recycling or final disposal.

8.5.6 Control of changes

The organization shall review and control changes for production or service provision, to the extent necessary to ensure continuing conformity with requirements.

The organization shall retain documented information describing the results of the review of changes, the person(s) authorizing the change, and any necessary actions arising from the review.

8.6 Release of products and services

The organization shall implement planned arrangements, at appropriate stages, to verify that the product and service requirements have been met.

The release of products and services to the customer shall not proceed until the planned arrangements have been satisfactorily completed, unless otherwise approved by a relevant authority and, as applicable, by the customer.

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f) retain documented information as evidence of the implementation of the audit programme and the audit results.

NOTE See ISO 19011 for guidance.

9.3 Management review

9.3.1 General

Top management shall review the organization's quality management system, at planned intervals, to ensure its continuing suitability, adequacy, effectiveness and alignment with the strategic direction of the organization.

9.3.2 Management review inputs

The management review shall be planned and carried out taking into consideration:

a) the status of actions from previous management reviews;

b) changes in external and internal issues that are relevant to the quality management system;

c) information on the performance and effectiveness of the quality management system, including trends in:

1) customer satisfaction and feedback from relevant interested parties;

2) the extent to which quality objectives have been met;

3) process performance and conformity of products and services;

4) nonconformities and corrective actions;

5) monitoring and measurement results;

6) audit results;

7) the performance of external providers;

d) the adequacy of resources;

e) the effectiveness of actions taken to address risks and opportunities (see 6.1);

f) opportunities for improvement.

9.3.3 Management review outputs

The outputs of the management review shall include decisions and actions related to:

a) opportunities for improvement;

b) any need for changes to the quality management system;

c) resource needs.

The organization shall retain documented information as evidence of the results of management reviews.

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10 Improvement

10.1 General

The organization shall determine and select opportunities for improvement and implement any necessary actions to meet customer requirements and enhance customer satisfaction.

These shall include:

a) improving products and services to meet requirements as well as to address future needs and expectations;

b) correcting, preventing or reducing undesired effects;

c) improving the performance and effectiveness of the quality management system.

NOTE Examples of improvement can include correction, corrective action, continual improvement, breakthrough change, innovation and re-organization.

10.2 Nonconformity and corrective action

10.2.1 When a nonconformity occurs, including any arising from complaints, the organization shall:

a) react to the nonconformity and, as applicable:

   1) take action to control and correct it;

   2) deal with the consequences;

b) evaluate the need for action to eliminate the cause(s) of the nonconformity, in order that it does not recur or occur elsewhere, by:

   1) reviewing and analysing the nonconformity;

   2) determining the causes of the nonconformity;

   3) determining if similar nonconformities exist, or could potentially occur;

c) implement any action needed;

d) review the effectiveness of any corrective action taken;

e) update risks and opportunities determined during planning, if necessary;

f) make changes to the quality management system, if necessary.

Corrective actions shall be appropriate to the effects of the nonconformities encountered.

10.2.2 The organization shall retain documented information as evidence of:

a) the nature of the nonconformities and any subsequent actions taken;

b) the results of any corrective action.

10.3 Continual improvement

The organization shall continually improve the suitability, adequacy and effectiveness of the quality management system.

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The organization shall consider the results of analysis and evaluation, and the outputs from management review, to determine if there are needs or opportunities that shall be addressed as part of continual improvement.

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Annex A
(informative)

Clarification of new structure, terminology and concepts

A.1 Structure and terminology

The clause structure (i.e. clause sequence) and some of the terminology of this edition of this International Standard, in comparison with the previous edition (ISO 9001:2008), have been changed to improve alignment with other management systems standards.

There is no requirement in this International Standard for its structure and terminology to be applied to the documented information of an organization's quality management system.

The structure of clauses is intended to provide a coherent presentation of requirements, rather than a model for documenting an organization's policies, objectives and processes. The structure and content of documented information related to a quality management system can often be more relevant to its users if it relates to both the processes operated by the organization and information maintained for other purposes.

There is no requirement for the terms used by an organization to be replaced by the terms used in this International Standard to specify quality management system requirements. Organizations can choose to use terms which suit their operations (e.g. using "records", "documentation" or "protocols" rather than "documented information"; or "supplier", "partner" or "vendor" rather than "external provider"). Table A.1 shows the major differences in terminology between this edition of this International Standard and the previous edition.

Table A.1 — Major differences in terminology between ISO 9001:2008 and ISO 9001:2015

ISO 9001:2008	ISO 9001:2015
Products	Products and services
Exclusions	Not used (See Clause A.5 for clarification of applicability)
Management representative	Not used (Similar responsibilities and authorities are assigned but no requirement for a single management representative)
Documentation, quality manual, documented procedures, records	Documented information
Work environment	Environment for the operation of processes
Monitoring and measuring equipment	Monitoring and measuring resources
Purchased product	Externally provided products and services
Supplier	External provider

A.2 Products and services

ISO 9001:2008 used the term "product" to include all output categories. This edition of this International Standard uses "products and services". "Products and services" include all output categories (hardware, services, software and processed materials).

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The specific inclusion of "services" is intended to highlight the differences between products and services in the application of some requirements. The characteristic of services is that at least part of the output is realized at the interface with the customer. This means, for example, that conformity to requirements cannot necessarily be confirmed before service delivery.

In most cases, products and services are used together. Most outputs that organizations provide to customers, or are supplied to them by external providers, include both products and services. For example, a tangible or intangible product can have some associated service or a service can have some associated tangible or intangible product.

A.3 Understanding the needs and expectations of interested parties

Subclause 4.2 specifies requirements for the organization to determine the interested parties that are relevant to the quality management system and the requirements of those interested parties. However, 4.2 does not imply extension of quality management system requirements beyond the scope of this International Standard. As stated in the scope, this International Standard is applicable where an organization needs to demonstrate its ability to consistently provide products and services that meet customer and applicable statutory and regulatory requirements, and aims to enhance customer satisfaction.

There is no requirement in this International Standard for the organization to consider interested parties where it has decided that those parties are not relevant to its quality management system. It is for the organization to decide if a particular requirement of a relevant interested party is relevant to its quality management system.

A.4 Risk-based thinking

The concept of risk-based thinking has been implicit in previous editions of this International Standard, e.g. through requirements for planning, review and improvement. This International Standard specifies requirements for the organization to understand its context (see 4.1) and determine risks as a basis for planning (see 6.1). This represents the application of risk-based thinking to planning and implementing quality management system processes (see 4.4) and will assist in determining the extent of documented information.

One of the key purposes of a quality management system is to act as a preventive tool. Consequently, this International Standard does not have a separate clause or subclause on preventive action. The concept of preventive action is expressed through the use of risk-based thinking in formulating quality management system requirements.

The risk-based thinking applied in this International Standard has enabled some reduction in prescriptive requirements and their replacement by performance-based requirements. There is greater flexibility than in ISO 9001:2008 in the requirements for processes, documented information and organizational responsibilities.

Although 6.1 specifies that the organization shall plan actions to address risks, there is no requirement for formal methods for risk management or a documented risk management process. Organizations can decide whether or not to develop a more extensive risk management methodology than is required by this International Standard, e.g. through the application of other guidance or standards.

Not all the processes of a quality management system represent the same level of risk in terms of the organization's ability to meet its objectives, and the effects of uncertainty are not the same for all organizations. Under the requirements of 6.1, the organization is responsible for its application of risk-based thinking and the actions it takes to address risk, including whether or not to retain documented information as evidence of its determination of risks.

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A.5 Applicability

This International Standard does not refer to "exclusions" in relation to the applicability of its requirements to the organization's quality management system. However, an organization can review the applicability of requirements due to the size or complexity of the organization, the management model it adopts, the range of the organization's activities and the nature of the risks and opportunities it encounters.

The requirements for applicability are addressed in 4.3, which defines conditions under which an organization can decide that a requirement cannot be applied to any of the processes within the scope of its quality management system. The organization can only decide that a requirement is not applicable if its decision will not result in failure to achieve conformity of products and services.

A.6 Documented information

As part of the alignment with other management system standards, a common clause on "documented information" has been adopted without significant change or addition (see 7.5). Where appropriate, text elsewhere in this International Standard has been aligned with its requirements. Consequently, "documented information" is used for all document requirements.

Where ISO 9001:2008 used specific terminology such as "document" or "documented procedures", "quality manual" or "quality plan", this edition of this International Standard defines requirements to "maintain documented information".

Where ISO 9001:2008 used the term "records" to denote documents needed to provide evidence of conformity with requirements, this is now expressed as a requirement to "retain documented information". The organization is responsible for determining what documented information needs to be retained, the period of time for which it is to be retained and the media to be used for its retention.

A requirement to "maintain" documented information does not exclude the possibility that the organization might also need to "retain" that same documented information for a particular purpose, e.g. to retain previous versions of it.

Where this International Standard refers to "information" rather than "documented information" (e.g. in 4.1: "The organization shall monitor and review the information about these external and internal issues"), there is no requirement that this information is to be documented. In such situations, the organization can decide whether or not it is necessary or appropriate to maintain documented information.

A.7 Organizational knowledge

In 7.1.6, this International Standard addresses the need to determine and manage the knowledge maintained by the organization, to ensure the operation of its processes and that it can achieve conformity of products and services.

Requirements regarding organizational knowledge were introduced for the purpose of:

a) safeguarding the organization from loss of knowledge, e.g.
   - through staff turnover;
   - failure to capture and share information;

b) encouraging the organization to acquire knowledge, e.g.
   - learning from experience;
   - mentoring;
   - benchmarking.

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A.8 Control of externally provided processes, products and services

All forms of externally provided processes, products and services are addressed in 8.4, e.g. whether through:

a) purchasing from a supplier;

b) an arrangement with an associate company;

c) outsourcing processes to an external provider.

Outsourcing always has the essential characteristic of a service, since it will have at least one activity necessarily performed at the interface between the provider and the organization.

The controls required for external provision can vary widely depending on the nature of the processes, products and services. The organization can apply risk-based thinking to determine the type and extent of controls appropriate to particular external providers and externally provided processes, products and services.

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Annex B
(informative)

Other International Standards on quality management and quality management systems developed by ISO/TC 176

The International Standards described in this annex have been developed by ISO/TC 176 to provide supporting information for organizations that apply this International Standard, and to provide guidance for organizations that choose to progress beyond its requirements. Guidance or requirements contained in the documents listed in this annex do not add to, or modify, the requirements of this International Standard.

Table B.1 shows the relationship between these standards and the relevant clauses of this International Standard.

This annex does not include reference to the sector-specific quality management system standards developed by ISO/TC 176.

This International Standard is one of the three core standards developed by ISO/TC 176.

— ISO 9000 *Quality management systems — Fundamentals and vocabulary* provides an essential background for the proper understanding and implementation of this International Standard. The quality management principles are described in detail in ISO 9000 and have been taken into consideration during the development of this International Standard. These principles are not requirements in themselves, but they form the foundation of the requirements specified by this International Standard. ISO 9000 also defines the terms, definitions and concepts used in this International Standard.

— ISO 9001 (this International Standard) specifies requirements aimed primarily at giving confidence in the products and services provided by an organization and thereby enhancing customer satisfaction. Its proper implementation can also be expected to bring other organizational benefits, such as improved internal communication, better understanding and control of the organization's processes.

— ISO 9004 *Managing for the sustained success of an organization — A quality management approach* provides guidance for organizations that choose to progress beyond the requirements of this International Standard, to address a broader range of topics that can lead to improvement of the organization's overall performance. ISO 9004 includes guidance on a self-assessment methodology for an organization to be able to evaluate the level of maturity of its quality management system.

ISO 9002: 2016: Quality management systems — Guidelines for the application of ISO 9001: 2015

The International Standards outlined below can provide assistance to organizations when they are establishing or seeking to improve their quality management systems, their processes or their activities.

— ISO 10001 *Quality management — Customer satisfaction — Guidelines for codes of conduct for organizations* provides guidance to an organization in determining that its customer satisfaction provisions meet customer needs and expectations. Its use can enhance customer confidence in an organization and improve customer understanding of what to expect from an organization, thereby reducing the likelihood of misunderstandings and complaints.

— ISO 10002 *Quality management — Customer satisfaction — Guidelines for complaints handling in organizations* provides guidance on the process of handling complaints by recognizing and addressing the needs and expectations of complainants and resolving any complaints received. ISO 10002 provides an open, effective and easy-to-use complaints process, including training of people. It also provides guidance for small businesses.

— ISO 10003 *Quality management — Customer satisfaction — Guidelines for dispute resolution external to organizations* provides guidance for effective and efficient external dispute resolution for

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product-related complaints. Dispute resolution gives an avenue of redress when organizations do not remedy a complaint internally. Most complaints can be resolved successfully within the organization, without adversarial procedures.

— ISO 10004 *Quality management — Customer satisfaction — Guidelines for monitoring and measuring* provides guidelines for actions to enhance customer satisfaction and to determine opportunities for improvement of products, processes and attributes that are valued by customers. Such actions can strengthen customer loyalty and help retain customers.

— ISO 10005 *Quality management systems — Guidelines for quality plans* provides guidance on establishing and using quality plans as a means of relating requirements of the process, product, project or contract, to work methods and practices that support product realization. Benefits of establishing a quality plan are increased confidence that requirements will be met, that processes are in control and the motivation that this can give to those involved.

— ISO 10006 *Quality management systems — Guidelines for quality management in projects* is applicable to projects from the small to large, from simple to complex, from an individual project to being part of a portfolio of projects. ISO 10006 is to be used by personnel managing projects and who need to ensure that their organization is applying the practices contained in the ISO quality management system standards.

— ISO 10007 *Quality management systems — Guidelines for configuration management* is to assist organizations applying configuration management for the technical and administrative direction over the life cycle of a product. Configuration management can be used to meet the product identification and traceability requirements specified in this International Standard.

— ISO 10008 *Quality management — Customer satisfaction — Guidelines for business-to-consumer electronic commerce transactions* gives guidance on how organizations can implement an effective and efficient business-to-consumer electronic commerce transaction (B2C ECT) system, and thereby provide a basis for consumers to have increased confidence in B2C ECTs, enhance the ability of organizations to satisfy consumers and help reduce complaints and disputes.

— ISO 10012 *Measurement management systems — Requirements for measurement processes and measuring equipment* provides guidance for the management of measurement processes and metrological confirmation of measuring equipment used to support and demonstrate compliance with metrological requirements. ISO 10012 provides quality management criteria for a measurement management system to ensure metrological requirements are met.

— ISO/TR 10013 *Guidelines for quality management system documentation* provides guidelines for the development and maintenance of the documentation necessary for a quality management system. ISO/TR 10013 can be used to document management systems other than those of the ISO quality management system standards, e.g. environmental management systems and safety management systems.

— ISO 10014 *Quality management — Guidelines for realizing financial and economic benefits* is addressed to top management. It provides guidelines for realizing financial and economic benefits through the application of quality management principles. It facilitates application of management principles and selection of methods and tools that enable the sustainable success of an organization.

— ISO 10015 *Quality management — Guidelines for training* provides guidelines to assist organizations in addressing issues related to training. ISO 10015 can be applied whenever guidance is required to interpret references to "education" and "training" within the ISO quality management system standards. Any reference to "training" includes all types of education and training.

— ISO/TR 10017 *Guidance on statistical techniques for ISO 9001:2000* explains statistical techniques which follow from the variability that can be observed in the behaviour and results of processes, even under conditions of apparent stability. Statistical techniques allow better use of available data to assist in decision making, and thereby help to continually improve the quality of products and processes to achieve customer satisfaction.

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— ISO 10018 *Quality management — Guidelines on people involvement and competence* provides guidelines which influence people involvement and competence. A quality management system depends on the involvement of competent people and the way that they are introduced and integrated into the organization. It is critical to determine, develop and evaluate the knowledge, skills, behaviour and work environment required.

— ISO 10019 *Guidelines for the selection of quality management system consultants and use of their services* provides guidance for the selection of quality management system consultants and the use of their services. It gives guidance on the process for evaluating the competence of a quality management system consultant and provides confidence that the organization's needs and expectations for the consultant's services will be met.

— ISO 19011 *Guidelines for auditing management systems* provides guidance on the management of an audit programme, on the planning and conducting of an audit of a management system, as well as on the competence and evaluation of an auditor and an audit team. ISO 19011 is intended to apply to auditors, organizations implementing management systems, and organizations needing to conduct audits of management systems.

Table B.1 — Relationship between other International Standards on quality management and quality management systems and the clauses of this International Standard

Other International Standard	Clause in this International Standard						
	4	5	6	7	8	9	10
ISO 9000	All	All	All	All	All	All	All
ISO 9004	All	All	All	All	All	All	All
ISO 10001					8.2.2, 8.5.1	9.1.2	
ISO 10002					8.2.1,	9.1.2	10.2.1
ISO 10003						9.1.2	
ISO 10004						9.1.2, 9.1.3	
ISO 10005		5.3	6.1, 6.2	All	All	9.1	10.2
ISO 10006	All	All	All	All	All	All	All
ISO 10007					8.5.2		
ISO 10008	All	All	All	All	All	All	All
ISO 10012				7.1.5			
ISO/TR 10013				7.5			
ISO 10014	All	All	All	All	All	All	All
ISO 10015				7.2			
ISO/TR 10017			6.1	7.1.5		9.1	
ISO 10018	All	All	All	All	All	All	All
ISO 10019					8.4		
ISO 19011						9.2	

NOTE "All" indicates that all the subclauses in the specific clause of this International Standard are related to the other International Standard.

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[1] ISO 9004, *Managing for the sustained success of an organization — A quality management approach*

[2] ISO 10001, *Quality management — Customer satisfaction — Guidelines for codes of conduct for organizations*

[3] ISO 10002, *Quality management — Customer satisfaction — Guidelines for complaints handling in organizations*

[4] ISO 10003, *Quality management — Customer satisfaction — Guidelines for dispute resolution external to organizations*

[5] ISO 10004, *Quality management — Customer satisfaction — Guidelines for monitoring and measuring*

[6] ISO 10005, *Quality management systems — Guidelines for quality plans*

[7] ISO 10006, *Quality management systems — Guidelines for quality management in projects*

[8] ISO 10007, *Quality management systems — Guidelines for configuration management*

[9] ISO 10008, *Quality management — Customer satisfaction — Guidelines for business-to-consumer electronic commerce transactions*

[10] ISO 10012, *Measurement management systems — Requirements for measurement processes and measuring equipment*

[11] ISO/TR 10013, *Guidelines for quality management system documentation*

[12] ISO 10014, *Quality management — Guidelines for realizing financial and economic benefits*

[13] ISO 10015, *Quality management — Guidelines for training*

[14] ISO/TR 10017, *Guidance on statistical techniques for ISO 9001:2000*

[15] ISO 10018, *Quality management — Guidelines on people involvement and competence*

[16] ISO 10019, *Guidelines for the selection of quality management system consultants and use of their services*

[17] ISO 14001, *Environmental management systems — Requirements with guidance for use*

[18] ISO 19011, *Guidelines for auditing management systems*

[19] ISO 31000, *Risk management — Principles and guidelines*

[20] ISO 37500, *Guidance on outsourcing*

[21] ISO/IEC 90003, *Software engineering — Guidelines for the application of ISO 9001:2008 to computer software*

[22] IEC 60300-1, *Dependability management — Part 1: Guidance for management and application*

[23] IEC 61160, *Design review*

[24] Quality management principles, ISO[1)]

[25] Selection and use of the ISO 9000 family of standards, ISO[1)]

[26] ISO 9001 for Small Businesses — What to do, ISO[1)]

1) Available from website: http://www.iso.org.

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[27] Integrated use of management system standards, ISO[1)]

[28] www.iso.org/tc176/sc02/public

[29] www.iso.org/tc176/ISO9001AuditingPracticesGroup

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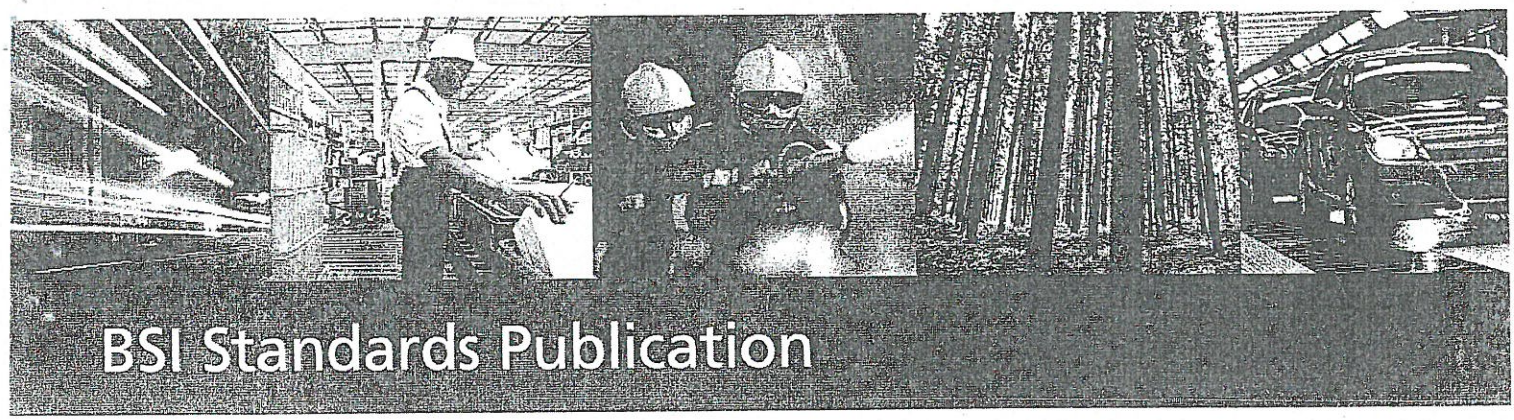

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National foreword

This British Standard is the UK implementation of EN ISO 14001:2015. It supersedes BS EN ISO 14001:2004 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee SES/1/1, Environmental management systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 14001

September 2015

ICS 13.020.10

Supersedes EN ISO 14001:2004

English Version

Environmental management systems - Requirements with guidance for use (ISO 14001:2015)

Systèmes de management environnemental - Exigences et lignes directrices pour son utilisation (ISO 14001:2015)

Umweltmanagementsysteme - Anforderungen mit Anleitung zur Anwendung (ISO 14001:2015)

This European Standard was approved by CEN on 14 September 2015.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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European foreword

This document (EN ISO 14001:2015) has been prepared by Technical Committee ISO/TC 207 "Environmental management".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2016, and conflicting national standards shall be withdrawn at the latest by March 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 14001:2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 14001:2015 has been approved by CEN as EN ISO 14001:2015 without any modification

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is Technical Committee ISO/TC 207, *Environmental management*, Subcommittee SC 1, *Environmental management systems*.

This third edition cancels and replaces the second edition (ISO 14001:2004), which has been technically revised. It also incorporates the Technical Corrigendum ISO 14001:2004/Cor.1:2009.

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Introduction

0.1 Background

Achieving a balance between the environment, society and the economy is considered essential to meet the needs of the present without compromising the ability of future generations to meet their needs. Sustainable development as a goal is achieved by balancing the three pillars of sustainability.

Societal expectations for sustainable development, transparency and accountability have evolved with increasingly stringent legislation, growing pressures on the environment from pollution, inefficient use of resources, improper waste management, climate change, degradation of ecosystems and loss of biodiversity.

This has led organizations to adopt a systematic approach to environmental management by implementing environmental management systems with the aim of contributing to the environmental pillar of sustainability.

0.2 Aim of an environmental management system

The purpose of this International Standard is to provide organizations with a framework to protect the environment and respond to changing environmental conditions in balance with socio-economic needs. It specifies requirements that enable an organization to achieve the intended outcomes it sets for its environmental management system.

A systematic approach to environmental management can provide top management with information to build success over the long term and create options for contributing to sustainable development by:

— protecting the environment by preventing or mitigating adverse environmental impacts;

— mitigating the potential adverse effect of environmental conditions on the organization;

— assisting the organization in the fulfilment of compliance obligations;

— enhancing environmental performance;

— controlling or influencing the way the organization's products and services are designed, manufactured, distributed, consumed and disposed by using a life cycle perspective that can prevent environmental impacts from being unintentionally shifted elsewhere within the life cycle;

— achieving financial and operational benefits that can result from implementing environmentally sound alternatives that strengthen the organization's market position;

— communicating environmental information to relevant interested parties.

This International Standard, like other International Standards, is not intended to increase or change an organization's legal requirements.

0.3 Success factors

The success of an environmental management system depends on commitment from all levels and functions of the organization, led by top management. Organizations can leverage opportunities to prevent or mitigate adverse environmental impacts and enhance beneficial environmental impacts, particularly those with strategic and competitive implications. Top management can effectively address its risks and opportunities by integrating environmental management into the organization's business processes, strategic direction and decision making, aligning them with other business priorities, and incorporating environmental governance into its overall management system. Demonstration of successful implementation of this International Standard can be used to assure interested parties that an effective environmental management system is in place.

Adoption of this International Standard, however, will not in itself guarantee optimal environmental outcomes. Application of this International Standard can differ from one organization to another

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due to the context of the organization. Two organizations can carry out similar activities but can have different compliance obligations, commitments in their environmental policy, environmental technologies and environmental performance goals, yet both can conform to the requirements of this International Standard.

The level of detail and complexity of the environmental management system will vary depending on the context of the organization, the scope of its environmental management system, its compliance obligations, and the nature of its activities, products and services, including its environmental aspects and associated environmental impacts.

0.4 Plan-Do-Check-Act model

The basis for the approach underlying an environmental management system is founded on the concept of Plan-Do-Check-Act (PDCA). The PDCA model provides an iterative process used by organizations to achieve continual improvement. It can be applied to an environmental management system and to each of its individual elements. It can be briefly described as follows.

— Plan: establish environmental objectives and processes necessary to deliver results in accordance with the organization's environmental policy.

— Do: implement the processes as planned.

— Check: monitor and measure processes against the environmental policy, including its commitments, environmental objectives and operating criteria, and report the results.

— Act: take actions to continually improve.

Figure 1 shows how the framework introduced in this International Standard could be integrated into a PDCA model, which can help new and existing users to understand the importance of a systems approach.

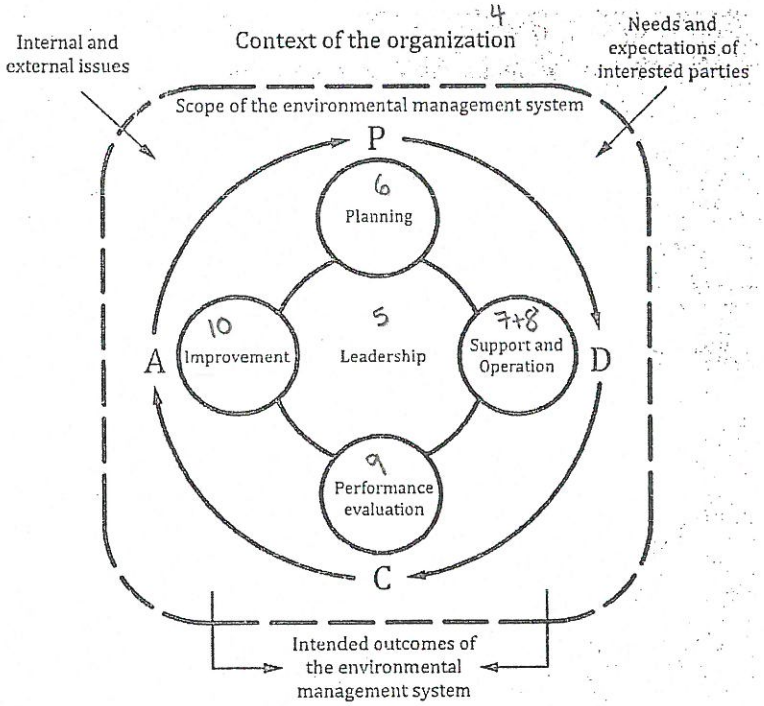

Figure 1 — Relationship between PDCA and the framework in this International Standard

0.5 Contents of this International Standard

This International Standard conforms to ISO's requirements for management system standards. These requirements include a high level structure, identical core text, and common terms with core definitions, designed to benefit users implementing multiple ISO management system standards.

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This International Standard does not include requirements specific to other management systems, such as those for quality, occupational health and safety, energy or financial management. However, this International Standard enables an organization to use a common approach and risk-based thinking to integrate its environmental management system with the requirements of other management systems.

This International Standard contains the requirements used to assess conformity. An organization that wishes to demonstrate conformity with this International Standard can do so by:

— making a self-determination and self-declaration, or

— seeking confirmation of its conformance by parties having an interest in the organization, such as customers, or

— seeking confirmation of its self-declaration by a party external to the organization, or

— seeking certification/registration of its environmental management system by an external organization.

Annex A provides explanatory information to prevent misinterpretation of the requirements of this International Standard. Annex B shows broad technical correspondence between the previous edition of this International Standard and this edition. Implementation guidance on environmental management systems is included in ISO 14004.

In this International Standard, the following verbal forms are used:

— "shall" indicates a requirement;

— "should" indicates a recommendation;

— "may" indicates a permission;

— "can" indicates a possibility or a capability.

Information marked as "NOTE" is intended to assist the understanding or use of the document. "Notes to entry" used in Clause 3 provide additional information that supplements the terminological data and can contain provisions relating to the use of a term.

The terms and definitions in Clause 3 are arranged in conceptual order, with an alphabetical index provided at the end of the document.

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Environmental management systems — Requirements with guidance for use

1 Scope

This International Standard specifies the requirements for an environmental management system that an organization can use to enhance its environmental performance. This International Standard is intended for use by an organization seeking to manage its environmental responsibilities in a systematic manner that contributes to the environmental pillar of sustainability.

This International Standard helps an organization achieve the intended outcomes of its environmental management system, which provide value for the environment, the organization itself and interested parties. Consistent with the organization's environmental policy, the intended outcomes of an environmental management system include:

— enhancement of environmental performance;

— fulfilment of compliance obligations;

— achievement of environmental objectives.

This International Standard is applicable to any organization, regardless of size, type and nature, and applies to the environmental aspects of its activities, products and services that the organization determines it can either control or influence considering a life cycle perspective. This International Standard does not state specific environmental performance criteria.

This International Standard can be used in whole or in part to systematically improve environmental management. Claims of conformity to this International Standard, however, are not acceptable unless all its requirements are incorporated into an organization's environmental management system and fulfilled without exclusion.

2 Normative references

There are no normative references.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 Terms related to organization and leadership

3.1.1
management system
set of interrelated or interacting elements of an *organization* (3.1.4) to establish policies and *objectives* (3.2.5) and *processes* (3.3.5) to achieve those objectives

Note 1 to entry: A management system can address a single discipline or several disciplines (e.g. quality, environment, occupational health and safety, energy, financial management).

Note 2 to entry: The system elements include the organization's structure, roles and responsibilities, planning and operation, performance evaluation and improvement.

Note 3 to entry: The scope of a management system can include the whole of the organization, specific and identified functions of the organization, specific and identified sections of the organization, or one or more functions across a group of organizations.

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3.1.2
environmental management system
part of the *management system* (3.1.1) used to manage *environmental aspects* (3.2.2), fulfil *compliance obligations* (3.2.9), and address *risks and opportunities* (3.2.11)

3.1.3
environmental policy
intentions and direction of an *organization* (3.1.4) related to *environmental performance* (3.4.11), as formally expressed by its *top management* (3.1.5)

3.1.4
organization
person or group of people that has its own functions with responsibilities, authorities and relationships to achieve its *objectives* (3.2.5)

Note 1 to entry: The concept of organization includes, but is not limited to sole-trader, company, corporation, firm, enterprise, authority, partnership, charity or institution, or part or combination thereof, whether incorporated or not, public or private.

3.1.5
top management
person or group of people who directs and controls an *organization* (3.1.4) at the highest level

Note 1 to entry: Top management has the power to delegate authority and provide resources within the organization.

Note 2 to entry: If the scope of the *management system* (3.1.1) covers only part of an organization, then top management refers to those who direct and control that part of the organization.

3.1.6
interested party
person or *organization* (3.1.4) that can affect, be affected by, or perceive itself to be affected by a decision or activity

EXAMPLE Customers, communities, suppliers, regulators, non-governmental organizations, investors and employees.

Note 1 to entry: To "perceive itself to be affected" means the perception has been made known to the organization.

3.2 Terms related to planning

3.2.1
environment
surroundings in which an *organization* (3.1.4) operates, including air, water, land, natural resources, flora, fauna, humans and their interrelationships

Note 1 to entry: Surroundings can extend from within an organization to the local, regional and global system.

Note 2 to entry: Surroundings can be described in terms of biodiversity, ecosystems, climate or other characteristics.

3.2.2
environmental aspect
element of an *organization's* (3.1.4) activities or products or services that interacts or can interact with the *environment* (3.2.1)

Note 1 to entry: An environmental aspect can cause (an) *environmental impact(s)* (3.2.4). A significant environmental aspect is one that has or can have one or more significant environmental impact(s).

Note 2 to entry: Significant environmental aspects are determined by the organization applying one or more criteria.

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3.2.3
environmental condition
state or characteristic of the *environment* (3.2.1) as determined at a certain point in time

3.2.4
environmental impact
change to the *environment* (3.2.1), whether adverse or beneficial, wholly or partially resulting from *organization's* (3.1.4) *environmental aspects* (3.2.2)

3.2.5
objective
result to be achieved

Note 1 to entry: An objective can be strategic, tactical, or operational.

Note 2 to entry: Objectives can relate to different disciplines (such as financial, health and safety, environmental goals) and can apply at different levels (such as strategic, organization-wide, project, proc service and *process* (3.3.5)).

Note 3 to entry: An objective can be expressed in other ways, e.g. as an intended outcome, a purpos operational criterion, as an *environmental objective* (3.2.6), or by the use of other words with similar mea (e.g. aim, goal, or target).

3.2.6
environmental objective
objective (3.2.5) set by the *organization* (3.1.4) consistent with its *environmental policy* (3.1.3)

3.2.7
prevention of pollution
use of *processes* (3.3.5), practices, techniques, materials, products, services or energy to avoid, re or control (separately or in combination) the creation, emission or discharge of any type of polluta waste, in order to reduce adverse *environmental impacts* (3.2.4)

Note 1 to entry: Prevention of pollution can include source reduction or elimination; process, product or se changes; efficient use of resources; material and energy substitution; reuse; recovery; recycling, reclam or treatment.

3.2.8
requirement
need or expectation that is stated, generally implied or obligatory

Note 1 to entry: "Generally implied" means that it is custom or common practice for the *organization* (3.1. *interested parties* (3.1.6) that the need or expectation under consideration is implied.

Note 2 to entry: A specified requirement is one that is stated, for example in *documented information* (3.3.2

Note 3 to entry: Requirements other than legal requirements become obligatory when the organization d to comply with them.

3.2.9
compliance obligations (preferred term)
legal requirements and other requirements (admitted term)
legal *requirements* (3.2.8) that an *organization* (3.1.4) has to comply with and other requirement an organization has to or chooses to comply with

Note 1 to entry: Compliance obligations are related to the *environmental management system* (3.1.2).

Note 2 to entry: Compliance obligations can arise from mandatory requirements, such as applicable la regulations, or voluntary commitments, such as organizational and industry standards, contractual relatio codes of practice and agreements with community groups or non-governmental organizations.

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3.2.10
risk
effect of uncertainty

Note 1 to entry: An effect is a deviation from the expected — positive or negative.

Note 2 to entry: Uncertainty is the state, even partial, of deficiency of information related to, understanding or knowledge of, an event, its consequence, or likelihood.

Note 3 to entry: Risk is often characterized by reference to potential *"events"* (as defined in ISO Guide 73:2009, 3.5.1.3) and *"consequences"* (as defined in ISO Guide 73:2009, 3.6.1.3), or a combination of these.

Note 4 to entry: Risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated *"likelihood"* (as defined in ISO Guide 73:2009, 3.6.1.1) of occurrence.

3.2.11
risks and opportunities
potential adverse effects (threats) and potential beneficial effects (opportunities)

3.3 Terms related to support and operation

3.3.1
competence
ability to apply knowledge and skills to achieve intended results

3.3.2
documented information
information required to be controlled and maintained by an *organization* (3.1.4) and the medium on which it is contained

Note 1 to entry: Documented information can be in any format and media, and from any source.

Note 2 to entry: Documented information can refer to:

— the *environmental management system* (3.1.2), including related *processes* (3.3.5);

— information created in order for the organization to operate (can be referred to as documentation);

— evidence of results achieved (can be referred to as records).

3.3.3
life cycle
consecutive and interlinked stages of a product (or service) system, from raw material acquisition or generation from natural resources to final disposal

Note 1 to entry: The life cycle stages include acquisition of raw materials, design, production, transportation/delivery, use, end-of-life treatment and final disposal.

[SOURCE: ISO 14044:2006, 3.1, modified — The words "(or service)" have been added to the definition and Note 1 to entry has been added.]

3.3.4
outsource (verb)
make an arrangement where an external *organization* (3.1.4) performs part of an organization's function or *process* (3.3.5)

Note 1 to entry: An external organization is outside the scope of the *management system* (3.1.1), although the outsourced function or process is within the scope.

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3.3.5
process
set of interrelated or interacting activities which transforms inputs into outputs

Note 1 to entry: A process can be documented or not.

3.4 Terms related to performance evaluation and improvement

3.4.1
audit
systematic, independent and documented *process* (3.3.5) for obtaining audit evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled

Note 1 to entry: An internal audit is conducted by the *organization* (3.1.4) itself, or by an external party on its behalf.

Note 2 to entry: An audit can be a combined audit (combining two or more disciplines).

Note 3 to entry: Independence can be demonstrated by the freedom from responsibility for the activity being audited or freedom from bias and conflict of interest.

Note 4 to entry: "Audit evidence" consists of records, statements of fact or other information which are relevant to the audit criteria and are verifiable; and "audit criteria" are the set of policies, procedures or *requirements* (3.2.8) used as a reference against which audit evidence is compared, as defined in ISO 19011:2011, 3.3 and 3.2 respectively.

3.4.2
conformity
fulfilment of a *requirement* (3.2.8)

3.4.3
nonconformity
non-fulfilment of a *requirement* (3.2.8)

Note 1 to entry: Nonconformity relates to requirements in this International Standard and additional *environmental management system* (3.1.2) requirements that an *organization* (3.1.4) establishes for itself.

3.4.4
corrective action
action to eliminate the cause of a *nonconformity* (3.4.3) and to prevent recurrence

Note 1 to entry: There can be more than one cause for a nonconformity.

3.4.5
continual improvement
recurring activity to enhance *performance* (3.4.10)

Note 1 to entry: Enhancing performance relates to the use of the *environmental management system* (3.1.2) to enhance *environmental performance* (3.4.11) consistent with the *organization's* (3.1.4) *environmental policy* (3.1.3).

Note 2 to entry: The activity need not take place in all areas simultaneously, or without interruption.

3.4.6
effectiveness
extent to which planned activities are realized and planned results achieved

3.4.7
indicator
measurable representation of the condition or status of operations, management or conditions

[SOURCE: ISO 14031:2013, 3.15]

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3.4.8
monitoring
determining the status of a system, a *process* (3.3.5) or an activity

Note 1 to entry: To determine the status, there might be a need to check, supervise or critically observe.

3.4.9
measurement
process (3.3.5) to determine a value

3.4.10
performance
measurable result

Note 1 to entry: Performance can relate either to quantitative or qualitative findings.

Note 2 to entry: Performance can relate to the management of activities, *processes* (3.3.5), products (including services), systems or *organizations* (3.1.4).

3.4.11
environmental performance
performance (3.4.10) related to the management of *environmental aspects* (3.2.2)

Note 1 to entry: For an *environmental management system* (3.1.2), results can be measured against the *organization's* (3.1.4) *environmental policy* (3.1.3), *environmental objectives* (3.2.6) or other criteria, using *indicators* (3.4.7).

4 Context of the organization

4.1 Understanding the organization and its context

The organization shall determine external and internal issues that are relevant to its purpose and that affect its ability to achieve the intended outcomes of its environmental management system. Such issues shall include environmental conditions being affected by or capable of affecting the organization.

4.2 Understanding the needs and expectations of interested parties

The organization shall determine:

a) the interested parties that are relevant to the environmental management system;

b) the relevant needs and expectations (i.e. requirements) of these interested parties;

c) which of these needs and expectations become its compliance obligations.

4.3 Determining the scope of the environmental management system

The organization shall determine the boundaries and applicability of the environmental management system to establish its scope.

When determining this scope, the organization shall consider:

a) the external and internal issues referred to in 4.1;

b) the compliance obligations referred to in 4.2;

c) its organizational units, functions and physical boundaries;

d) its activities, products and services;

e) its authority and ability to exercise control and influence.

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Once the scope is defined, all activities, products and services of the organization within that scope need to be included in the environmental management system.

The scope shall be maintained as documented information and be available to interested parties.

4.4 Environmental management system

To achieve the intended outcomes, including enhancing its environmental performance, the organization shall establish, implement, maintain and continually improve an environmental management system, including the processes needed and their interactions, in accordance with the requirements of this International Standard.

The organization shall consider the knowledge gained in 4.1 and 4.2 when establishing and maintaining the environmental management system.

5 Leadership

5.1 Leadership and commitment

Top management shall demonstrate leadership and commitment with respect to the environmental management system by:

a) taking accountability for the effectiveness of the environmental management system;

b) ensuring that the environmental policy and environmental objectives are established and are compatible with the strategic direction and the context of the organization;

c) ensuring the integration of the environmental management system requirements into the organization's business processes;

d) ensuring that the resources needed for the environmental management system are available;

e) communicating the importance of effective environmental management and of conforming to the environmental management system requirements;

f) ensuring that the environmental management system achieves its intended outcomes;

g) directing and supporting persons to contribute to the effectiveness of the environmental management system;

h) promoting continual improvement;

i) supporting other relevant management roles to demonstrate their leadership as it applies to their areas of responsibility.

NOTE Reference to "business" in this International Standard can be interpreted broadly to mean those activities that are core to the purposes of the organization's existence.

5.2 Environmental policy

Top management shall establish, implement and maintain an environmental policy that, within the defined scope of its environmental management system:

a) is appropriate to the purpose and context of the organization, including the nature, scale and environmental impacts of its activities, products and services;

b) provides a framework for setting environmental objectives;

c) includes a commitment to the protection of the environment, including prevention of pollution and other specific commitment(s) relevant to the context of the organization;

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NOTE Other specific commitment(s) to protect the environment can include sustainable resource use, climate change mitigation and adaptation, and protection of biodiversity and ecosystems.

d) includes a commitment to fulfil its compliance obligations;

e) includes a commitment to continual improvement of the environmental management system to enhance environmental performance.

The environmental policy shall:

— be maintained as documented information;

— be communicated within the organization;

— be available to interested parties.

5.3 Organizational roles, responsibilities and authorities

Top management shall ensure that the responsibilities and authorities for relevant roles are assigned and communicated within the organization.

Top management shall assign the responsibility and authority for:

a) ensuring that the environmental management system conforms to the requirements of this International Standard;

b) reporting on the performance of the environmental management system, including environmental performance, to top management.

6 Planning

6.1 Actions to address risks and opportunities

6.1.1 General

The organization shall establish, implement and maintain the process(es) needed to meet the requirements in 6.1.1 to 6.1.4.

When planning for the environmental management system, the organization shall consider:

a) the issues referred to in 4.1;

b) the requirements referred to in 4.2;

c) the scope of its environmental management system;

and determine the risks and opportunities, related to its environmental aspects (see 6.1.2), compliance obligations (see 6.1.3) and other issues and requirements, identified in 4.1 and 4.2, that need to be addressed to:

— give assurance that the environmental management system can achieve its intended outcomes;

— prevent or reduce undesired effects, including the potential for external environmental conditions to affect the organization;

— achieve continual improvement.

Within the scope of the environmental management system, the organization shall determine potential emergency situations, including those that can have an environmental impact.

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The organization shall maintain documented information of its:

— risks and opportunities that need to be addressed;

— process(es) needed in 6.1.1 to 6.1.4, to the extent necessary to have confidence they are carried out as planned.

6.1.2 Environmental aspects

Within the defined scope of the environmental management system, the organization shall determine the environmental aspects of its activities, products and services that it can control and those that it can influence, and their associated environmental impacts, considering a life cycle perspective.

When determining environmental aspects, the organization shall take into account:

a) change, including planned or new developments, and new or modified activities, products and services;

b) abnormal conditions and reasonably foreseeable emergency situations.

The organization shall determine those aspects that have or can have a significant environmental impact, i.e. significant environmental aspects, by using established criteria.

The organization shall communicate its significant environmental aspects among the various levels and functions of the organization, as appropriate.

The organization shall maintain documented information of its:

— environmental aspects and associated environmental impacts;

— criteria used to determine its significant environmental aspects;

— significant environmental aspects.

NOTE Significant environmental aspects can result in risks and opportunities associated with either adverse environmental impacts (threats) or beneficial environmental impacts (opportunities).

6.1.3 Compliance obligations

The organization shall:

a) determine and have access to the compliance obligations related to its environmental aspects;

b) determine how these compliance obligations apply to the organization;

c) take these compliance obligations into account when establishing, implementing, maintaining and continually improving its environmental management system.

The organization shall maintain documented information of its compliance obligations.

NOTE Compliance obligations can result in risks and opportunities to the organization.

6.1.4 Planning action

The organization shall plan:

a) to take actions to address its:

1) significant environmental aspects;

2) compliance obligations;

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3) risks and opportunities identified in 6.1.1;

b) how to:

1) integrate and implement the actions into its environmental management system processes (see 6.2, Clause 7, Clause 8 and 9.1), or other business processes;

2) evaluate the effectiveness of these actions (see 9.1).

When planning these actions, the organization shall consider its technological options and its financial, operational and business requirements.

6.2 Environmental objectives and planning to achieve them

6.2.1 Environmental objectives

The organization shall establish environmental objectives at relevant functions and levels, taking into account the organization's significant environmental aspects and associated compliance obligations, and considering its risks and opportunities.

The environmental objectives shall be:

a) consistent with the environmental policy;

b) measurable (if practicable);

c) monitored;

d) communicated;

e) updated as appropriate.

The organization shall maintain documented information on the environmental objectives.

6.2.2 Planning actions to achieve environmental objectives

When planning how to achieve its environmental objectives, the organization shall determine:

a) what will be done;

b) what resources will be required;

c) who will be responsible;

d) when it will be completed;

e) how the results will be evaluated, including indicators for monitoring progress toward achievement of its measurable environmental objectives (see 9.1.1).

The organization shall consider how actions to achieve its environmental objectives can be integrated into the organization's business processes.

7 Support

7.1 Resources

The organization shall determine and provide the resources needed for the establishment, implementation, maintenance and continual improvement of the environmental management system.

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7.2 Competence

The organization shall:

a) determine the necessary competence of person(s) doing work under its control that affects its environmental performance and its ability to fulfil its compliance obligations;

b) ensure that these persons are competent on the basis of appropriate education, training or experience;

c) determine training needs associated with its environmental aspects and its environmental management system;

d) where applicable, take actions to acquire the necessary competence, and evaluate the effectiveness of the actions taken.

NOTE Applicable actions can include, for example, the provision of training to, the mentoring of, or the re-assignment of currently employed persons; or the hiring or contracting of competent persons.

The organization shall retain appropriate documented information as evidence of competence.

7.3 Awareness

The organization shall ensure that persons doing work under the organization's control are aware of:

a) the environmental policy;

b) the significant environmental aspects and related actual or potential environmental impacts associated with their work;

c) their contribution to the effectiveness of the environmental management system, including the benefits of enhanced environmental performance;

d) the implications of not conforming with the environmental management system requirements, including not fulfilling the organization's compliance obligations.

7.4 Communication

7.4.1 General

The organization shall establish, implement and maintain the process(es) needed for internal and external communications relevant to the environmental management system, including:

a) on what it will communicate;

b) when to communicate;

c) with whom to communicate;

d) how to communicate.

When establishing its communication process(es), the organization shall:

— take into account its compliance obligations;

— ensure that environmental information communicated is consistent with information generated within the environmental management system, and is reliable.

The organization shall respond to relevant communications on its environmental management system.

The organization shall retain documented information as evidence of its communications, as appropriate.

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7.4.2 Internal communication

The organization shall:

a) internally communicate information relevant to the environmental management system among the various levels and functions of the organization, including changes to the environmental management system, as appropriate;

b) ensure its communication process(es) enable(s) persons doing work under the organization's control to contribute to continual improvement.

7.4.3 External communication

The organization shall externally communicate information relevant to the environmental management system, as established by the organization's communication process(es) and as required by its compliance obligations.

7.5 Documented information

7.5.1 General

The organization's environmental management system shall include:

a) documented information required by this International Standard;

b) documented information determined by the organization as being necessary for the effectiveness of the environmental management system.

NOTE The extent of documented information for an environmental management system can differ from one organization to another due to:

— the size of organization and its type of activities, processes, products and services;

— the need to demonstrate fulfilment of its compliance obligations;

— the complexity of processes and their interactions;

— the competence of persons doing work under the organization's control.

7.5.2 Creating and updating

When creating and updating documented information, the organization shall ensure appropriate:

a) identification and description (e.g. a title, date, author, or reference number);

b) format (e.g. language, software version, graphics) and media (e.g. paper, electronic);

c) review and approval for suitability and adequacy.

7.5.3 Control of documented information

Documented information required by the environmental management system and by this International Standard shall be controlled to ensure:

a) it is available and suitable for use, where and when it is needed;

b) it is adequately protected (e.g. from loss of confidentiality, improper use, or loss of integrity).

For the control of documented information, the organization shall address the following activities as applicable:

— distribution, access, retrieval and use;

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— storage and preservation, including preservation of legibility;

— control of changes (e.g. version control);

— retention and disposition.

Documented information of external origin determined by the organization to be necessary for the planning and operation of the environmental management system shall be identified, as appropriate, and controlled.

NOTE Access can imply a decision regarding the permission to view the documented information only, or the permission and authority to view and change the documented information.

8 Operation

8.1 Operational planning and control

The organization shall establish, implement, control and maintain the processes needed to meet environmental management system requirements, and to implement the actions identified in 6.1 and 6.2, by:

— establishing operating criteria for the process(es);

— implementing control of the process(es), in accordance with the operating criteria.

NOTE Controls can include engineering controls and procedures. Controls can be implemented following a hierarchy (e.g. elimination, substitution, administrative) and can be used individually or in combination.

The organization shall control planned changes and review the consequences of unintended changes, taking action to mitigate any adverse effects, as necessary.

The organization shall ensure that outsourced processes are controlled or influenced. The type and extent of control or influence to be applied to the process(es) shall be defined within the environmental management system.

Consistent with a life cycle perspective, the organization shall:

a) establish controls, as appropriate, to ensure that its environmental requirement(s) is (are) addressed in the design and development process for the product or service, considering each life cycle stage;

b) determine its environmental requirement(s) for the procurement of products and services, as appropriate;

c) communicate its relevant environmental requirement(s) to external providers, including contractors;

d) consider the need to provide information about potential significant environmental impacts associated with the transportation or delivery, use, end-of-life treatment and final disposal of its products and services.

The organization shall maintain documented information to the extent necessary to have confidence that the processes have been carried out as planned.

8.2 Emergency preparedness and response

The organization shall establish, implement and maintain the process(es) needed to prepare for and respond to potential emergency situations identified in 6.1.1.

The organization shall:

a) prepare to respond by planning actions to prevent or mitigate adverse environmental impacts from emergency situations;

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b) respond to actual emergency situations;

c) take action to prevent or mitigate the consequences of emergency situations, appropriate to the magnitude of the emergency and the potential environmental impact;

d) periodically test the planned response actions, where practicable;

e) periodically review and revise the process(es) and planned response actions, in particular after the occurrence of emergency situations or tests;

f) provide relevant information and training related to emergency preparedness and response, as appropriate, to relevant interested parties, including persons working under its control.

The organization shall maintain documented information to the extent necessary to have confidence that the process(es) is (are) carried out as planned.

9 Performance evaluation

9.1 Monitoring, measurement, analysis and evaluation

9.1.1 General

The organization shall monitor, measure, analyse and evaluate its environmental performance.

The organization shall determine:

a) what needs to be monitored and measured;

b) the methods for monitoring, measurement, analysis and evaluation, as applicable, to ensure valid results;

c) the criteria against which the organization will evaluate its environmental performance, and appropriate indicators;

d) when the monitoring and measuring shall be performed;

e) when the results from monitoring and measurement shall be analysed and evaluated.

The organization shall ensure that calibrated or verified monitoring and measurement equipment is used and maintained, as appropriate.

The organization shall evaluate its environmental performance and the effectiveness of the environmental management system.

The organization shall communicate relevant environmental performance information both internally and externally, as identified in its communication process(es) and as required by its compliance obligations.

The organization shall retain appropriate documented information as evidence of the monitoring, measurement, analysis and evaluation results.

9.1.2 Evaluation of compliance

The organization shall establish, implement and maintain the process(es) needed to evaluate fulfilment of its compliance obligations.

The organization shall:

a) determine the frequency that compliance will be evaluated;

b) evaluate compliance and take action if needed;

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c) maintain knowledge and understanding of its compliance status.

The organization shall retain documented information as evidence of the compliance evaluation result(s).

9.2 Internal audit

9.2.1 General

The organization shall conduct internal audits at planned intervals to provide information on whether the environmental management system:

a) conforms to:

1) the organization's own requirements for its environmental management system;

2) the requirements of this International Standard;

b) is effectively implemented and maintained.

9.2.2 Internal audit programme

The organization shall establish, implement and maintain (an) internal audit programme(s), including the frequency, methods, responsibilities, planning requirements and reporting of its internal audits.

When establishing the internal audit programme, the organization shall take into consideration the environmental importance of the processes concerned, changes affecting the organization and the results of previous audits.

The organization shall:

a) define the audit criteria and scope for each audit;

b) select auditors and conduct audits to ensure objectivity and the impartiality of the audit process;

c) ensure that the results of the audits are reported to relevant management.

The organization shall retain documented information as evidence of the implementation of the audit programme and the audit results.

9.3 Management review

Top management shall review the organization's environmental management system, at planned intervals, to ensure its continuing suitability, adequacy and effectiveness.

The management review shall include consideration of:

a) the status of actions from previous management reviews;

b) changes in:

1) external and internal issues that are relevant to the environmental management system;

2) the needs and expectations of interested parties, including compliance obligations;

3) its significant environmental aspects;

4) risks and opportunities;

c) the extent to which environmental objectives have been achieved;

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d) information on the organization's environmental performance, including trends in:

1) nonconformities and corrective actions;

2) monitoring and measurement results;

3) fulfilment of its compliance obligations;

4) audit results;

e) adequacy of resources;

f) relevant communication(s) from interested parties, including complaints;

g) opportunities for continual improvement.

The outputs of the management review shall include:

— conclusions on the continuing suitability, adequacy and effectiveness of the environmental management system;

— decisions related to continual improvement opportunities;

— decisions related to any need for changes to the environmental management system, including resources;

— actions, if needed, when environmental objectives have not been achieved;

— opportunities to improve integration of the environmental management system with other business processes, if needed;

— any implications for the strategic direction of the organization.

The organization shall retain documented information as evidence of the results of management reviews.

10 Improvement

10.1 General

The organization shall determine opportunities for improvement (see 9.1, 9.2 and 9.3) and implement necessary actions to achieve the intended outcomes of its environmental management system.

10.2 Nonconformity and corrective action

When a nonconformity occurs, the organization shall:

a) react to the nonconformity and, as applicable:

1) take action to control and correct it;

2) deal with the consequences, including mitigating adverse environmental impacts;

b) evaluate the need for action to eliminate the causes of the nonconformity, in order that it does not recur or occur elsewhere, by:

1) reviewing the nonconformity;

2) determining the causes of the nonconformity;

3) determining if similar nonconformities exist, or could potentially occur;

c) implement any action needed;

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d) review the effectiveness of any corrective action taken;

e) make changes to the environmental management system, if necessary.

Corrective actions shall be appropriate to the significance of the effects of the nonconformities encountered, including the environmental impact(s).

The organization shall retain documented information as evidence of:

— the nature of the nonconformities and any subsequent actions taken;

— the results of any corrective action.

10.3 Continual improvement

The organization shall continually improve the suitability, adequacy and effectiveness of the environmental management system to enhance environmental performance.

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Annex A
(informative)

Guidance on the use of this International Standard

A.1 General

The explanatory information given in this annex is intended to prevent misinterpretation of the requirements contained in this International Standard. While this information addresses and is consistent with these requirements, it is not intended to add to, subtract from, or in any way modify them.

The requirements in this International Standard need to be viewed from a systems or holistic perspective. The user should not read a particular sentence or clause of this International Standard in isolation from other clauses. There is an interrelationship between the requirements in some clauses and the requirements in other clauses. For example, the organization needs to understand the relationship between the commitments in its environmental policy and the requirements that are specified in other clauses.

Management of change is an important part of maintaining the environmental management system that ensures the organization can achieve the intended outcomes of its environmental management system on an ongoing basis. Management of change is addressed in various requirements of this International Standard, including

— maintaining the environmental management system (see 4.4),

— environmental aspects (see 6.1.2),

— internal communication (see 7.4.2),

— operational control (see 8.1),

— internal audit programme (see 9.2.2), and

— management review (see 9.3).

As part of managing change, the organization should address planned and unplanned changes to ensure that the unintended consequences of these changes do not have a negative effect on the intended outcomes of the environmental management system. Examples of change include:

— planned changes to products, processes, operations, equipment or facilities;

— changes in staff or external providers, including contractors;

— new information related to environmental aspects, environmental impacts and related technologies;

— changes in compliance obligations.

A.2 Clarification of structure and terminology

The clause structure and some of the terminology of this International Standard have been changed to improve alignment with other management systems standards. There is, however, no requirement in this International Standard for its clause structure or terminology to be applied to an organization's environmental management system documentation. There is no requirement to replace the terms used by an organization with the terms used in this International Standard. Organizations can choose to use terms that suit their business, e.g. "records", "documentation", or "protocols", rather than "documented information".

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A.3 Clarification of concepts

In addition to the terms and definitions given in Clause 3, clarification of selected concepts is provided below to prevent misunderstanding.

— In this International Standard, the use of the word "any" implies selection or choice.

— The words "appropriate" and "applicable" are not interchangeable. "Appropriate" means suitable (for, to) and implies some degree of freedom, while "applicable" means relevant or possible to apply and implies that if it can be done, it needs to be done.

— The word "consider" means it is necessary to think about the topic but it can be excluded; whereas "take into account" means it is necessary to think about the topic but it cannot be excluded.

— "Continual" indicates duration that occurs over a period of time, but with intervals of interruption (unlike "continuous" which indicates duration without interruption). "Continual" is therefore the appropriate word to use when referring to improvement.

— In this International Standard, the word "effect" is used to describe the result of a change to the organization. The phrase "environmental impact" refers specifically to the result of a change to the environment.

— The word "ensure" means the responsibility can be delegated, but not the accountability.

— This International Standard uses the term "interested party"; the term "stakeholder" is a synonym as it represents the same concept.

This International Standard uses some new terminology. A brief explanation is given below to aid both new users and those who have used previous editions of this International Standard.

— The phrase "compliance obligations" replaces the phrase "legal requirements and other requirements to which the organization subscribes" used in the previous edition of this International Standard. The intent of this new phrase does not differ from that of the previous edition.

— "Documented information" replaces the nouns "documentation", "documents" and "records" used in previous editions of this International Standard. To distinguish the intent of the generic term "documented information", this International Standard now uses the phrase "retain documented information as evidence of...." to mean records, and "maintain documented information" to mean documentation other than records. The phrase "as evidence of...." is not a requirement to meet legal evidentiary requirements; its intent is only to indicate objective evidence needs to be retained.

— The phrase "external provider" means an external supplier organization (including a contractor) that provides a product or a service.

— The change from "identify" to "determine" is intended to harmonize with the standardized management system terminology. The word "determine" implies a discovery process that results in knowledge. The intent does not differ from that of previous editions.

— The phrase "intended outcome" is what the organization intends to achieve by implementing its environmental management system. The minimal intended outcomes include enhancement of environmental performance, fulfilment of compliance obligations and achievement of environmental objectives. Organizations can set additional intended outcomes for their environmental management system. For example, consistent with their commitment to protection of the environment, an organization may establish an intended outcome to work towards sustainable development.

— The phrase "person(s) doing work under its control" includes persons working for the organization and those working on its behalf for which the organization has responsibility (e.g. contractors). It replaces the phrase "persons working for it or on its behalf" and "persons working for or on behalf of the organization" used in the previous edition of this International Standard. The intent of this new phrase does not differ from that of the previous edition.

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— The concept of "target" used in previous editions of this International Standard is captured within the term "environmental objective".

A.4 Context of the organization

A.4.1 Understanding the organization and its context

The intent of 4.1 is to provide a high-level, conceptual understanding of the important issues that can affect, either positively or negatively, the way the organization manages its environmental responsibilities. Issues are important topics for the organization, problems for debate and discussion or changing circumstances that affect the organization's ability to achieve the intended outcomes it sets for its environmental management system.

Examples of internal and external issues which can be relevant to the context of the organization include:

a) environmental conditions related to climate, air quality, water quality, land use, existing contamination, natural resource availability and biodiversity, that can either affect the organization's purpose, or be affected by its environmental aspects;

b) the external cultural, social, political, legal, regulatory, financial, technological, economic, natural and competitive circumstances, whether international, national, regional or local;

c) the internal characteristics or conditions of the organization, such as its activities, products and services, strategic direction, culture and capabilities (i.e. people, knowledge, processes, systems).

An understanding of the context of an organization is used to establish, implement, maintain and continually improve its environmental management system (see 4.4). The internal and external issues that are determined in 4.1 can result in risks and opportunities to the organization or to the environmental management system (see 6.1.1 to 6.1.3). The organization determines those that need to be addressed and managed (see 6.1.4, 6.2, Clause 7, Clause 8 and 9.1).

A.4.2 Understanding the needs and expectations of interested parties

An organization is expected to gain a general (i.e. high-level, not detailed) understanding of the expressed needs and expectations of those internal and external interested parties that have been determined by the organization to be relevant. The organization considers the knowledge gained when determining which of these needs and expectations it has to or it chooses to comply with, i.e. its compliance obligations (see 6.1.1).

In the case of an interested party perceiving itself to be affected by the organization's decisions or activities related to environmental performance, the organization considers the relevant needs and expectations that are made known or have been disclosed by the interested party to the organization.

Interested party requirements are not necessarily requirements of the organization. Some interested party requirements reflect needs and expectations that are mandatory because they have been incorporated into laws, regulations, permits and licences by governmental or even court decision. The organization may decide to voluntarily agree to or adopt other requirements of interested parties (e.g. entering into a contractual relationship, subscribing to a voluntary initiative). Once the organization adopts them, they become organizational requirements (i.e. compliance obligations) and are taken into account when planning the environmental management system (see 4.4). A more detailed-level analysis of its compliance obligations is performed in 6.1.3.

A.4.3 Determining the scope of the environmental management system

The scope of the environmental management system is intended to clarify the physical and organizational boundaries to which the environmental management system applies, especially if the organization is a part of a larger organization. An organization has the freedom and flexibility to define its boundaries. It may choose to implement this International Standard throughout the entire

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organization, or only in (a) specific part(s) of the organization, as long as the top management for that (those) part(s) has authority to establish an environmental management system.

In setting the scope, the credibility of the environmental management system depends upon the choice of organizational boundaries. The organization considers the extent of control or influence that it can exert over activities, products and services considering a life cycle perspective. Scoping should not be used to exclude activities, products, services, or facilities that have or can have significant environmental aspects, or to evade its compliance obligations. The scope is a factual and representative statement of the organization's operations included within its environmental management system boundaries that should not mislead interested parties.

Once the organization asserts it conforms to this International Standard, the requirement to make the scope statement available to interested parties applies.

A.4.4 Environmental management system

The organization retains authority and accountability to decide how it fulfils the requirements of this International Standard, including the level of detail and extent to which it:

a) establishes one or more processes to have confidence that it (they) is (are) controlled, carried out as planned and achieve the desired results;

b) integrates environmental management system requirements into its various business processes, such as design and development, procurement, human resources, sales and marketing;

c) incorporates issues associated with the context of the organization (see 4.1) and interested party requirements (see 4.2) within its environmental management system.

If this International Standard is implemented for (a) specific part(s) of an organization, policies, processes and documented information developed by other parts of the organization can be used to meet the requirements of this International Standard, provided they are applicable to that (those) specific part(s).

For information on maintaining the environmental management system as part of management of change, see Clause A.1.

A.5 Leadership

A.5.1 Leadership and commitment

To demonstrate leadership and commitment, there are specific responsibilities related to the environmental management system in which top management should be personally involved or which top management should direct. Top management may delegate responsibility for these actions to others, but it retains accountability for ensuring the actions are performed.

A.5.2 Environmental policy

An environmental policy is a set of principles stated as commitments in which top management outlines the intentions of the organization to support and enhance its environmental performance. The environmental policy enables the organization to set its environmental objectives (see 6.2), take actions to achieve the intended outcomes of the environmental management system, and achieve continual improvement (see Clause 10).

Three basic commitments for the environmental policy are specified in this International Standard to:

a) protect the environment;

b) fulfil the organization's compliance obligations;

c) continually improve the environmental management system to enhance environmental performance.

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These commitments are then reflected in the processes an organization establishes to address specific requirements in this International Standard, to ensure a robust, credible and reliable environmental management system.

The commitment to protect the environment is intended to not only prevent adverse environmental impacts through prevention of pollution, but to protect the natural environment from harm and degradation arising from the organization's activities, products and services. The specific commitment(s) an organization pursues should be relevant to the context of the organization, including the local or regional environmental conditions. These commitments can address, for example, water quality, recycling, or air quality, and can also include commitments related to climate change mitigation and adaptation, protection of biodiversity and ecosystems, and restoration.

While all the commitments are important, some interested parties are especially concerned with the organization's commitment to fulfil its compliance obligations, particularly applicable legal requirements. This International Standard specifies a number of interconnected requirements related to this commitment. These include the need to:

— determine compliance obligations;

— ensure operations are carried out in accordance with these compliance obligations;

— evaluate fulfilment of the compliance obligations;

— correct nonconformities.

A.5.3 Organizational roles, responsibilities and authorities

Those involved in the organization's environmental management system should have a clear understanding of their role, responsibility(ies) and authority(ies) for conforming to the requirements of this International Standard and achieving the intended outcomes.

The specific roles and responsibilities identified in 5.3 may be assigned to an individual, sometimes referred to as the "management representative", shared by several individuals, or assigned to a member of top management.

A.6 Planning

A.6.1 Actions to address risks and opportunities

A.6.1.1 General

The overall intent of the process(es) established in 6.1.1 is to ensure that the organization is able to achieve the intended outcomes of its environmental management system, to prevent or reduce undesired effects, and to achieve continual improvement. The organization can ensure this by determining its risks and opportunities that need to be addressed and planning action to address them. These risks and opportunities can be related to environmental aspects, compliance obligations, other issues or other needs and expectations of interested parties.

Environmental aspects (see 6.1.2) can create risks and opportunities associated with adverse environmental impacts, beneficial environmental impacts, and other effects on the organization. The risks and opportunities related to environmental aspects can be determined as part of the significance evaluation or determined separately.

Compliance obligations (see 6.1.3) can create risks and opportunities, such as failing to comply (which can damage the organization's reputation or result in legal action) or performing beyond its compliance obligations (which can enhance the organization's reputation).

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The organization can also have risks and opportunities related to other issues, including environmental conditions or needs and expectations of interested parties, which can affect the organization's ability to achieve the intended outcomes of its environmental management system, e.g.

a) environmental spillage due to literacy or language barriers among workers who cannot understand local work procedures;

b) increased flooding due to climate change that could affect the organizations premises;

c) lack of available resources to maintain an effective environmental management system due to economic constraints;

d) introducing new technology financed by governmental grants, which could improve air quality;

e) water scarcity during periods of drought that could affect the organization's ability to operate its emission control equipment.

Emergency situations are unplanned or unexpected events that need the urgent application of specific competencies, resources or processes to prevent or mitigate their actual or potential consequences. Emergency situations can result in adverse environmental impacts or other effects on the organization. When determining potential emergency situations (e.g. fire, chemical spill, severe weather), the organization should consider:

— the nature of onsite hazards (e.g. flammable liquids, storage tanks, compressed gasses);

— the most likely type and scale of an emergency situation;

— the potential for emergency situations at a nearby facility (e.g. plant, road, railway line).

Although risks and opportunities need to be determined and addressed, there is no requirement for formal risk management or a documented risk management process. It is up to the organization to select the method it will use to determine its risks and opportunities. The method may involve a simple qualitative process or a full quantitative assessment depending on the context in which the organization operates.

The risks and opportunities identified (see 6.1.1 to 6.1.3) are inputs for planning actions (see 6.1.4) and for establishing the environmental objectives (see 6.2).

A.6.1.2 Environmental aspects

An organization determines its environmental aspects and associated environmental impacts, and determines those that are significant and, therefore, need to be addressed by its environmental management system.

Changes to the environment, either adverse or beneficial, that result wholly or partially from environmental aspects are called environmental impacts. The environmental impact can occur at local, regional and global scales, and also can be direct, indirect or cumulative by nature. The relationship between environmental aspects and environmental impacts is one of cause and effect.

When determining environmental aspects, the organization considers a life cycle perspective. This does not require a detailed life cycle assessment; thinking carefully about the life cycle stages that can be controlled or influenced by the organization is sufficient. Typical stages of a product (or service) life cycle include raw material acquisition, design, production, transportation/delivery, use, end-of-life treatment and final disposal. The life cycle stages that are applicable will vary depending on the activity, product or service.

An organization needs to determine the environmental aspects within the scope of its environmental management system. It takes into account the inputs and outputs (both intended and unintended) that are associated with its current and relevant past activities, products and services; planned or new developments; and new or modified activities, products and services. The method used should consider normal and abnormal operating conditions, shut-down and start-up conditions, as well as the reasonably foreseeable emergency situations identified in 6.1.1. Attention should be paid to prior

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occurrences of emergency situations. For information on environmental aspects as part of managing change, see Clause A.1.

An organization does not have to consider each product, component or raw material individually to determine and evaluate their environmental aspects; it may group or categorize activities, products and services when they have common characteristics.

When determining its environmental aspects, the organization can consider:

a) emissions to air;

b) releases to water;

c) releases to land;

d) use of raw materials and natural resources;

e) use of energy;

f) energy emitted (e.g. heat, radiation, vibration (noise), light);

g) generation of waste and/or by-products;

h) use of space.

In addition to the environmental aspects that it can control directly, an organization determines whether there are environmental aspects that it can influence. These can be related to products and services used by the organization which are provided by others, as well as products and services that it provides to others, including those associated with (an) outsourced process(es). With respect to those an organization provides to others, it can have limited influence on the use and end-of-life treatment of the products and services. In all circumstances, however, it is the organization that determines the extent of control it is able to exercise, the environmental aspects it can influence, and the extent to which it chooses to exercise such influence.

Consideration should be given to environmental aspects related to the organization's activities, products and services, such as:

— design and development of its facilities, processes, products and services;

— acquisition of raw materials, including extraction;

— operational or manufacturing processes, including warehousing;

— operation and maintenance of facilities, organizational assets and infrastructure;

— environmental performance and practices of external providers;

— product transportation and service delivery, including packaging;

— storage, use and end-of-life treatment of products;

— waste management, including reuse, refurbishing, recycling and disposal.

There is no single method for determining significant environmental aspects, however, the method and criteria used should provide consistent results. The organization sets the criteria for determining its significant environmental aspects. Environmental criteria are the primary and minimum criteria for assessing environmental aspects. Criteria can relate to the environmental aspect (e.g. type, size, frequency) or the environmental impact (e.g. scale, severity, duration, exposure). Other criteria may also be used. An environmental aspect might not be significant when only considering environmental criteria. It can, however, reach or exceed the threshold for determining significance when other criteria are considered. These other criteria can include organizational issues, such as legal requirements or interested party concerns. These other criteria are not intended to be used to downgrade an aspect that is significant based on its environmental impact.

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A significant environmental aspect can result in one or more significant environmental impacts, and can therefore result in risks and opportunities that need to be addressed to ensure the organization can achieve the intended outcomes of its environmental management system.

A.6.1.3 Compliance obligations

The organization determines, at a sufficiently detailed level, the compliance obligations it identified in 4.2 that are applicable to its environmental aspects, and how they apply to the organization. Compliance obligations include legal requirements that an organization has to comply with and other requirements that the organization has to or chooses to comply with.

Mandatory legal requirements related to an organization's environmental aspects can include, if applicable:

a) requirements from governmental entities or other relevant authorities;

b) international, national and local laws and regulations;

c) requirements specified in permits, licenses or other forms of authorization;

d) orders, rules or guidance from regulatory agencies;

e) judgements of courts or administrative tribunals.

Compliance obligations also include other interested party requirements related to its environmental management system which the organization has to or chooses to adopt. These can include, if applicable:

— agreements with community groups or non-governmental organizations;

— agreements with public authorities or customers;

— organizational requirements;

— voluntary principles or codes of practice;

— voluntary labelling or environmental commitments;

— obligations arising under contractual arrangements with the organization;

— relevant organizational or industry standards.

A.6.1.4 Planning action

The organization plans, at a high level, the actions that have to be taken within the environmental management system to address its significant environmental aspects, its compliance obligations, and the risks and opportunities identified in 6.1.1 that are a priority for the organization to achieve the intended outcomes of its environmental management system.

The actions planned may include establishing environmental objectives (see 6.2) or may be incorporated into other environmental management system processes, either individually or in combination. Some actions may be addressed through other management systems, such as those related to occupational health and safety or business continuity, or through other business processes related to risk, financial or human resource management.

When considering its technological options, an organization should consider the use of best-available techniques, where economically viable, cost-effective and judged appropriate. This is not intended to imply that organizations are obliged to use environmental cost-accounting methodologies.

A.6.2 Environmental objectives and planning to achieve them

Top management may establish environmental objectives at the strategic level, the tactical level or the operational level. The strategic level includes the highest levels of the organization and the

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environmental objectives can be applicable to the whole organization. The tactical and operational levels can include environmental objectives for specific units or functions within the organization and should be compatible with its strategic direction.

Environmental objectives should be communicated to persons working under the organization's control who have the ability to influence the achievement of environmental objectives.

The requirement to "take into account significant environmental aspects" does not mean that an environmental objective has to be established for each significant environmental aspect, however, these have a high priority when establishing environmental objectives.

"Consistent with the environmental policy" means that the environmental objectives are broadly aligned and harmonized with the commitments made by top management in the environmental policy, including the commitment to continual improvement.

Indicators are selected to evaluate the achievement of measurable environmental objectives. "Measurable" means it is possible to use either quantitative or qualitative methods in relation to a specified scale to determine if the environmental objective has been achieved. By specifying "if practicable", it is acknowledged that there can be situations when it is not feasible to measure an environmental objective, however, it is important that the organization is able to determine whether or not an environmental objective has been achieved.

For additional information on environmental indicators, see ISO 14031.

A.7 Support

A.7.1 Resources

Resources are needed for the effective functioning and improvement of the environmental management system and to enhance environmental performance. Top management should ensure that those with environmental management system responsibilities are supported with the necessary resources. Internal resources may be supplemented by (an) external provider(s).

Resources can include human resources, natural resources, infrastructure, technology and financial resources. Examples of human resources include specialized skills and knowledge. Examples of infrastructure resources include the organization's buildings, equipment, underground tanks and drainage system.

A.7.2 Competence

The competency requirements of this International Standard apply to persons working under the organization's control who affect its environmental performance, including persons:

a) whose work has the potential to cause a significant environmental impact;

b) who are assigned responsibilities for the environmental management system, including those who:

   1) determine and evaluate environmental impacts or compliance obligations;

   2) contribute to the achievement of an environmental objective;

   3) respond to emergency situations;

   4) perform internal audits;

   5) perform evaluations of compliance.

A.7.3 Awareness

Awareness of the environmental policy should not be taken to mean that the commitments need to be memorized or that persons doing work under the organization's control have a copy of the documented

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environmental policy. Rather, these persons should be aware of its existence, its purpose and their role in achieving the commitments, including how their work can affect the organization's ability to fulfil its compliance obligations.

A.7.4 Communication

Communication allows the organization to provide and obtain information relevant to its environmental management system, including information related to its significant environmental aspects, environmental performance, compliance obligations and recommendations for continual improvement. Communication is a two-way process, in and out of the organization.

When establishing its communication process(es), the internal organizational structure should be considered to ensure communication with the most appropriate levels and functions. A single approach can be adequate to meet the needs of many different interested parties, or multiple approaches might be necessary to address specific needs of individual interested parties.

The information received by the organization can contain requests from interested parties for specific information related to the management of its environmental aspects, or can contain general impressions or views on the way the organization carries out that management. These impressions or views can be positive or negative. In the latter case (e.g. complaints), it is important that a prompt and clear answer is provided by the organization. A subsequent analysis of these complaints can provide valuable information for detecting improvement opportunities for the environmental management system.

Communication should:

a) be transparent, i.e. the organization is open in the way it derives what it has reported on;

b) be appropriate, so that information meets the needs of relevant interested parties, enabling them to participate;

c) be truthful and not misleading to those who rely on the information reported;

d) be factual, accurate and able to be trusted;

e) not exclude relevant information;

f) be understandable to interested parties.

For information on communication as part of managing change, see Clause A.1. For additional information on communication, see ISO 14063.

A.7.5 Documented information

An organization should create and maintain documented information in a manner sufficient to ensure a suitable, adequate and effective environmental management system. The primary focus should be on the implementation of the environmental management system and on environmental performance, not on a complex documented information control system.

In addition to the documented information required in specific clauses of this International Standard, an organization may choose to create additional documented information for purposes of transparency, accountability, continuity, consistency, training, or ease in auditing.

Documented information originally created for purposes other than the environmental management system may be used. The documented information associated with the environmental management system may be integrated with other information management systems implemented by the organization. It does not have to be in the form of a manual.

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A.8 Operation

A.8.1 Operational planning and control

The type and extent of operational control(s) depend on the nature of the operations, the risks and opportunities, significant environmental aspects and compliance obligations. An organization has the flexibility to select the type of operational control methods, individually or in combination, that are necessary to make sure the process(es) is (are) effective and achieve(s) the desired results. Such methods can include:

a) designing (a) process(es) in such a way as to prevent error and ensure consistent results;

b) using technology to control (a) process(es) and prevent adverse results (i.e. engineering controls);

c) using competent personnel to ensure the desired results;

d) performing (a) process(es) in a specified way;

e) monitoring or measuring (a) process(es) to check the results;

f) determining the use and amount of documented information necessary.

The organization decides the extent of control needed within its own business processes (e.g. procurement process) to control or influence (an) outsourced process(es) or (a) provider(s) of products and services. Its decision should be based upon factors such as:

— knowledge, competence and resources, including:

  — the competence of the external provider to meet the organization's environmental management system requirements;

  — the technical competence of the organization to define appropriate controls or assess the adequacy of controls;

— the importance and potential effect the product and service will have on the organization's ability to achieve the intended outcome of its environmental management system;

— the extent to which control of the process is shared;

— the capability of achieving the necessary control through the application of its general procurement process;

— improvement opportunities available.

When a process is outsourced, or when products and services are supplied by (an) external provider(s), the organization's ability to exert control or influence can vary from direct control to limited or no influence. In some cases, an outsourced process performed onsite might be under the direct control of an organization; in other cases, an organization's ability to influence an outsourced process or external supplier might be limited.

When determining the type and extent of operational controls related to external providers, including contractors, the organization may consider one or more factors such as:

— environmental aspects and associated environmental impacts;

— risks and opportunities associated with the manufacturing of its products or the provision of its services;

— the organization's compliance obligations.

For information on operational control as part of managing change, see Clause A.1. For information on life cycle perspective, see A.6.1.2.

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An outsourced process is one that fulfils all of the following:

— it is within the scope of the environmental management system;

— it is integral to the organization's functioning;

— it is needed for the environmental management system to achieve its intended outcome;

— liability for conforming to requirements is retained by the organization;

— the organization and the external provider have a relationship where the process is perceived by interested parties as being carried out by the organization.

Environmental requirements are the organization's environmentally-related needs and expectations that it establishes for, and communicates to, its interested parties (e.g. an internal function, such as procurement; a customer; an external provider).

Some of the organization's significant environmental impacts can occur during the transportation, delivery, use, end-of-life treatment or final disposal of its product or service. By providing information, an organization can potentially prevent or mitigate adverse environmental impacts during these life cycle stages.

A.8.2 Emergency preparedness and response

It is the responsibility of each organization to be prepared and to respond to emergency situations in a manner appropriate to its particular needs. For information on determining emergency situations, see A.6.1.1.

When planning its emergency preparedness and response process(es), the organization should consider:

a) the most appropriate method(s) for responding to an emergency situation;

b) internal and external communication process(es);

c) the action(s) required to prevent or mitigate environmental impacts;

d) mitigation and response action(s) to be taken for different types of emergency situations;

e) the need for post-emergency evaluation to determine and implement corrective actions;

f) periodic testing of planned emergency response actions;

g) training of emergency response personnel;

h) a list of key personnel and aid agencies, including contact details (e.g. fire department, spillage clean-up services);

i) evacuation routes and assembly points;

j) the possibility of mutual assistance from neighbouring organizations.

A.9 Performance evaluation

A.9.1 Monitoring, measurement, analysis and evaluation

A.9.1.1 General

When determining what should be monitored and measured, in addition to progress on environmental objectives, the organization should take into account its significant environmental aspects, compliance obligations and operational controls.

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The methods used by the organization to monitor and measure, analyse and evaluate should be defined in the environmental management system, in order to ensure that:

a) the timing of monitoring and measurement is coordinated with the need for analysis and evaluation results;

b) the results of monitoring and measurement are reliable, reproducible and traceable;

c) the analysis and evaluation are reliable and reproducible, and enable the organization to report trends.

The environmental performance analysis and evaluation results should be reported to those with responsibility and authority to initiate appropriate action.

For additional information on environmental performance evaluation, see ISO 14031.

A.9.1.2 Evaluation of compliance

The frequency and timing of compliance evaluations can vary depending on the importance of the requirement, variations in operating conditions, changes in compliance obligations and the organization's past performance. An organization can use a variety of methods to maintain its knowledge and understanding of its compliance status, however, all compliance obligations need to be evaluated periodically.

If compliance evaluation results indicate a failure to fulfil a legal requirement, the organization needs to determine and implement the actions necessary to achieve compliance. This might require communication with a regulatory agency and agreement on a course of action to fulfil its legal requirements. Where such an agreement is in place, it becomes a compliance obligation.

A non-compliance is not necessarily elevated to a nonconformity if, for example, it is identified and corrected by the environmental management system processes. Compliance-related nonconformities need to be corrected, even if those nonconformities have not resulted in actual non-compliance with legal requirements.

A.9.2 Internal audit

Auditors should be independent of the activity being audited, wherever practicable, and should in all cases act in a manner that is free from bias and conflict of interest.

Nonconformities identified during internal audits are subject to appropriate corrective action.

When considering the results of previous audits, the organization should include:

a) previously identified nonconformities and the effectiveness of the actions taken;

b) results of internal and external audits.

For additional information on establishing an internal audit programme, performing environmental management system audits and evaluating the competence of audit personnel, see ISO 19011. For information on internal audit programme as part of managing change, see Clause A.1.

A.9.3 Management review

The management review should be high-level; it does not need to be an exhaustive review of detailed information. The management review topics need not be addressed all at once. The review may take place over a period of time and can be part of regularly scheduled management activities, such as board or operational meetings; it does not need to be a separate activity.

Relevant complaints received from interested parties are reviewed by top management to determine opportunities for improvement.

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For information on management review as part of managing change, see Clause A.1.

"Suitability" refers to how the environmental management system fits the organization, its operations, culture and business systems. "Adequacy" refers to whether it meets the requirements of this International Standard and is implemented appropriately. "Effectiveness" refers to whether it is achieving the desired results.

A.10 Improvement

A.10.1 General

The organization should consider the results from analysis and evaluation of environmental performance, evaluation of compliance, internal audits and management review when taking action to improve.

Examples of improvement include corrective action, continual improvement, breakthrough change, innovation and re-organization.

A.10.2 Nonconformity and corrective action

One of the key purposes of an environmental management system is to act as a preventive tool. The concept of preventive action is now captured in 4.1 (i.e. understanding the organization and its context) and 6.1 (i.e. actions to address risks and opportunities).

A.10.3 Continual improvement

The rate, extent and timescale of actions that support continual improvement are determined by the organization. Environmental performance can be enhanced by applying the environmental management system as a whole or improving one or more of its elements.

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Annex B
(informative)

Correspondence between ISO 14001:2015 and ISO 14001:2004

Table B.1 shows the correspondence between this edition of this International Standard (ISO 14001:2015) and the previous edition (ISO 14001:2004).

Table B.1 — Correspondence between ISO 14001:2015 and ISO 14001:2004

ISO 14001:2015		ISO 14001:2004	
Clause title	Clause number	Clause number	Clause title
Introduction			Introduction
Scope	1	1	Scope
Normative references	2	2	Normative references
Terms and definitions	3	3	Terms and definitions
Context of the organization (title only)	4		
		4	Environmental management system requirements (title only)
Understanding the organization and its context	4.1		
Understanding the needs and expectations of interested parties	4.2		
Determining the scope of the environmental management system	4.3	4.1	General requirements
Environmental management system	4.4	4.1	General requirements
Leadership (title only)	5		
Leadership and commitment	5.1		
Environmental policy	5.2	4.2	Environmental policy
Organizational roles, responsibilities and authorities	5.3	4.4.1	Resources, roles, responsibility and authority
Planning (title only)	6	4.3	Planning (title only)
Actions to address risks and opportunities (title only)	6.1		
General	6.1.1		
Environmental aspects	6.1.2	4.3.1	Environmental aspects
Compliance obligations	6.1.3	4.3.2	Legal and other requirements
Planning action	6.1.4		
Environmental objectives and planning to achieve them (title only)	6.2	4.3.3	Objectives, targets and programme(s)
Environmental objectives	6.2.1		
Planning actions to achieve environmental objectives	6.2.2		
Support (title only)	7	4.4	Implementation and operation (title only)
Resources	7.1	4.4.1	Resources, roles, responsibility and authority
Competence	7.2	4.4.2	Competence, training and awareness
Awareness	7.3		
Communication (title only)	7.4	4.4.3	Communication
General	7.4.1		
Internal communication	7.4.2		
External communication	7.4.3		

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Table B.1 *(continued)*

ISO 14001:2015		ISO 14001:2004	
Clause title	**Clause number**	**Clause number**	**Clause title**
Documented information (title only)	7.5	4.4.4	Documentation
General	7.5.1		
Creating and updating	7.5.2	4.4.5	Control of documents
		4.5.4	Control of records
Control of documented information	7.5.3	4.4.5	Control of documents
		4.5.4	Control of records
Operation (title only)	8	4.4	Implementation and operation (title only)
Operational planning and control	8.1	4.4.6	Operational control
Emergency preparedness and response	8.2	4.4.7	Emergency preparedness and response
Performance evaluation (title only)	9	4.5	Checking (title only)
Monitoring, measurement, analysis and evaluation (title only)	9.1	4.5.1	Monitoring and measurement
General	9.1.1		
Evaluation of compliance	9.1.2	4.5.2	Evaluation of compliance
Internal audit (title only)	9.2	4.5.5	Internal audit
General	9.2.1		
Internal audit programme	9.2.2		
Management review	9.3	4.6	Management review
Improvement (title only)	10		
General	10.1		
Nonconformity and corrective action	10.2	4.5.3	Nonconformity, corrective action and preventive action
Continual improvement	10.3		
Guidance on the use of this International Standard	Annex A	Annex A	Guidance on the use of this International Standard
Correspondence between ISO 14001:2015 and ISO 14001:2004	Annex B		
		Annex B	Correspondence between ISO 14001:2004 and ISO 9001:2008
Bibliography			Bibliography
Alphabetical index of terms			

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[4] ISO 14044, *Environmental management — Life cycle assessment — Requirements and guidelines*

[5] ISO 14063, *Environmental management — Environmental communication — Guidelines and examples*

[6] ISO 19011, *Guidelines for auditing management systems*

[7] ISO 31000, *Risk management — Principles and guidelines*

[8] ISO 50001, *Energy management systems — Requirements with guidance for use*

[9] ISO Guide 73, *Risk management — Vocabulary*

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may exist. The approach should always be tailored to the organization and 'off-the-shelf' packages avoided. Senior management have much to gain by networking with their counterparts in different businesses and this exchange of ideas and concerns and discussion of common issues can help to fine-tune the approach which is being used and to advance the development of TQM.

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Chapter Five

A Framework for the Introduction of TQM

B. G. Dale, A. van der Wiele and J. D. van Iwaarden

Introduction

This chapter presents a framework for the introduction of TQM. It is divided into four main sections, all of which need to be addressed once the motivation for TQM has been identified. The motivation will set the overall strategic direction of TQM and influence the relevant importance of each part of the framework. The foundation of the framework is 'organizing' and the two pillars which form its structure are the use of 'systems and techniques' and 'measurement and feedback'. 'Changing the culture' is something which must be considered at all stages, including the initial organizing activities, but primarily results from the other initiatives described, interacts with them throughout the process, and will evolve with the organization's operating experience of TQM. People, both as individuals and working in teams, are central to TQM and without their skills and endeavours continuous improvement will simply not occur. The framework integrates the various aspects of TQM, from 'soft' approaches such as teamwork, employee development and human relations, to the use of 'hard' techniques such as SPC and FMEA. A diagrammatic representation of the framework is given in figure 5.1 and a summary of its features in table 5.1.

The framework provides an indication of how the various aspects of TQM fit together and is particularly useful for those organizations who:

- Are taking their first steps on the TQM journey.
- Have got ISO 9000 series registration and require some guidance and advice on what to do next.

Barrie Dale acknowledges the contribution of Dr Ruth Boaden to the development of the framework described in this chapter. He also wishes to thank the directors and managers who have commented on earlier versions of this chapter, in particular, the past and current associates of the TQM Multi-Company Teaching Company Programme for their invaluable suggestions in the development of the framework.

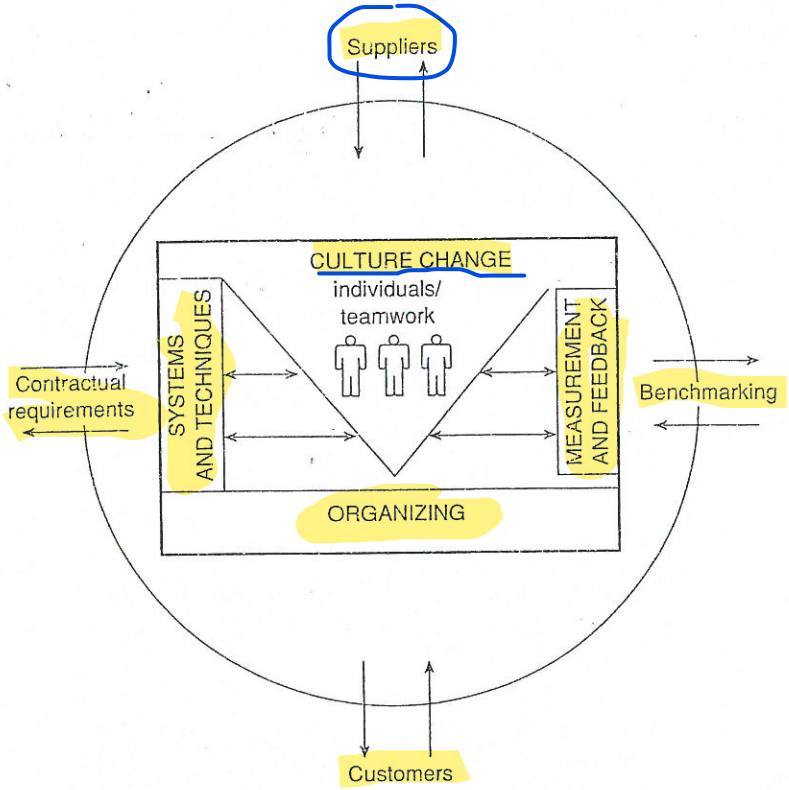


Figure 5.1 The TQM framework
Source: Dale and Boaden (1993)

- Are attempting to develop improvement plans and controls across a number of sites.
- Have less than three years' operating experience of TQM and continuous improvement.

The framework is not a 'how-to' guide for TQM; there are a considerable number of such guides outlining a step-by-step approach to TQM. These guides usually have a set starting point and follow a single route. The framework is a means of developing and presenting plans in a non-prescriptive manner; it is a guide to action and not to be followed slavishly. In this way it allows an organization to choose an appropriate starting point and course of action and develop TQM and the improvement process at a pace which suits its business situation and available resources. If used in the correct manner the framework ensures that there are adequate mechanisms in place to enable continuous improvements to occur. At this stage the organization can turn to the use of self-assessment methods against a recognized excellence model to identify

Table 5.1 TQM framework: a summary

Organizing	*Systems and techniques*	*Measurement and feedback*	*Changing the culture*
Long-term strategy for TQM formulated and integrated with other strategies; improvement plans developed	Identification of applicable tools and techniques at each stage of continuous improvement	Key internal and external performance measures identified, defined and developed	Assess the current status of organizational culture before developing plans for change
Definition of quality, TQM and continuous improvement developed and agreed	Training in the use of tools and techniques, for the right people at the right time	Ongoing discussion with customers about expected performance	Recognize the ongoing nature of culture change, and the need to outline specific changes
Choice of approach to TQM	Identification of other systems and standards that may be required by customers or legislation	Means for celebration and communication of success and teamwork developed	Recognize the role of people as an asset
Identification of sources of advice	Use of a formal quality system	Benchmarking, once improvement is under way	Plan change consistently and incrementally
Stages of improvement activity identified, taking the starting point into account	Identification of key business processes and improvement based on these processes	Consideration of the link between results from improvement and rewards	To minimize conflict, consider the inter-relationships of all activities within the organization
Executive leadership and commitment to TQM		Means of assessing the progress towards world-class performance considered, e.g. EFQM or MBNQA models	Identify factors which indicate that culture is changing
Vision and mission statements and values developed and communicated to all members of the organization			Consider the national and local culture
Decide the means by which TQM will be communicated			
Formal program of education and training for all members of the organization			
Organizational infrastructure established to facilitate local ownership of TQM			
Teamwork established as a way of working and part of the infrastructure			

strengths and weaknesses in its approach (for details of self-assessment, see chapter 24).

The framework was initially developed as a theoretical tool, from the author's research experience. The details of the framework as presented here have been based on its use by the senior management teams of a number of major manufacturing companies and a number of service organizations, in both private and public environments. In addition, the framework has also been used in syndicate exercises by some 300 people from a wide variety of manufacturing and service organizations, in America, Hong Kong, South Africa and the UK. With its solid research base and practical testing and application, it is a very robust framework.

Organizing

This foundation stage is concerned with the motivation for starting TQM and a process of continuous improvement (which will influence the TQM approach adopted) and the resultant strategies, plans, and means necessary to introduce and develop the process. The appropriate time to introduce TQM must also be considered, as should communication down and across the organization of what TQM is, why it is being adopted and what will be involved, including the cost and required resources.

It is also useful to consider the problems and obstacles likely to be encountered in the introduction of TQM and agree actions to avoid or minimize them: see chapter 7 for details of typical difficulties and obstacles. Similar examples are also provided by Bunney and Dale (1996), Crofton and Dale (1996), Dale (1991) and Dale and Lightburn (1992).

In planning this stage full use should be made of pilot schemes, whether they are in relation to the use of a technique such as SPC or the operation of improvement teams. In this way, problems can be resolved on a small scale and experiences fed back and reacted to before development and advancement of the issue under study.

The key actions in this stage can be described as follows:

1 *A clear long-term strategy for TQM should be formulated and integrated with other key business strategies, departmental policies and objectives. This also includes the development of a quality policy and quality strategy. The aim should be to integrate them with the long-term plans of the business.* Any short-term strategy which the organization needs to pursue (e.g. to cater for rapid turnover of staff, market downturns, exchange fluctuations and supply difficulties) should be consistent and integrated with the long-term strategy. The strategy must then be developed into a series of improvement plans and objectives

for each department and function and also for those areas and aspects of the business which have been identified as requiring improvement, and methods of monitoring and assessment developed. Such plans will also result from the other three sections of the framework and also from actions and initiatives which are independent of it. The methodology of policy deployment (e.g. Dale 1990; Akao 1991) is important in this respect; details are given in chapter 8.

2 *A common organizational definition for quality, TQM, and other terms used as part of the continuous improvement process, should be developed, agreed and communicated in simple and non-technical language, after discussion.* Consideration should also be given to the term (e.g. TQM, total quality performance, business excellence, world-class, customer first, business improvement or continuous improvement) used to describe the improvement initiative, or indeed to whether a term is required. The development of a glossary of quality-related terms should be considered; useful guidance is provided in BS EN ISO 9000 (2000). A lack of such definitions can hamper the progress of TQM; a glossary will also help to prevent misunderstandings, and competing views and different interpretations being expressed by the various functions and levels within the business and also with customers and suppliers, improving communication both inside and outside the business. Without clear definition it is difficult to deliver what is espoused as quality. In particular, many people have difficulty in understanding the difference between TQM and quality assurance.

3 *The approach to TQM should be decided.* This will depend on the existing culture of the organization as well as the preferences of senior management but is an important element in its success. Whichever TQM approach is adopted, it should be flexible and capable of fine-tuning to suit the business needs and objectives of the organization. Some of the available options were explored in chapter 1.

4 *The organizations and people (internal and external) who can be sources of advice on the approach to TQM, and its introduction and development, should be identified.* Such advice may also be required to develop the quality management system to meet the requirements of ISO 9001 and/or QS 9000 and the application of particular tools and techniques. Useful expertise is often available within the organization. Such people know the internal workings of the organization, its processes and the unique problems which exist. This expertise should not be overlooked. It is always beneficial to combine internal expertise with external consultants' knowledge and skills. In service organizations, which have large numbers of relatively small locations, or those manufacturing organizations which have a variety of operating sites spread across a country or throughout a number of countries, it is recommended that a 'directory of resources and experiences' is compiled to encourage co-operation and mutual assistance.

5 *Stages of improvement activity should be identified at the outset, taking into account the starting point of the organization, the motivation for TQM and the tools and techniques which may be applicable.* For example, Newall and Dale (1991) identified six stages of an improvement process – awareness, education and training, consolidation, problem identification and improvement planning, implementation of quality plans and assessment. A formal project-planning methodology, which requires the identification of milestones and their ongoing monitoring, is also a vital tool at this stage.

6 *Executive leadership, tangible commitment and support should be recognized as being crucial at all stages (see chapter 2).* Such commitment should be demonstrated in actions such as allocating time to understanding and involvement in TQM, being visible and accessible ('management by wandering about'), holding discussions with people at the operating level of the business, providing words of encouragement and advice, 'quality' placed at the top of every business meeting agenda, identification of key performance measurements, use of tools and techniques in their everyday work activities, developing personal action plans, seeking feedback on their style of management, acting as a mentor to improvement teams, attending training sessions, writing articles on TQM in the company newsletter, ensuring that any decisions made are consistent with the agreed plans and objectives, and exhibiting a passion for TQM. There is no magic formula for achieving such commitment, although the characteristics of good leaders are currently being researched with the aim of identifying appropriate management guidelines for the future. Useful guidance is provided by Bass (1985), Kotter (1990), Maxwell (1993, 1995), and Townsend and Gebhardt (1997a).

7 *Vision and mission statements which are concise and understandable to all employees should be developed, displayed and communicated in company-unique language.* It is also important to outline what needs to be done to make these statements and the associated company values become a reality, including the benefits that will accrue from TQM and how it will affect the way employees go about their jobs. The format and timing of education/awareness-raising events should also be outlined. The influence of the historical culture of the organization, its people, processes, technology, products/services and the views of its current senior executives must not be underestimated in this process.

8 *It is important that everyone in the organization can identify with the vision and mission statements* since this will help to unite and focus employees on where the organization is heading. Employees must feel that the vision statement is achievable. Regular assessments should also be carried out to see whether employees believe that the organization is getting closer to achieving the objectives outlined in these statements.

9 *Communication is a key component of TQM and management cannot communicate too much on issues relating to TQM and the improvements made.*

The communication should be based on common sense, be two-way, use jargon-free language and be consistent in the approach adopted. It must be good enough to win the 'hearts and minds' of all employees. The means of communication should include both written and verbal mediums in both group and individual mode (e.g. notice boards, whiteboards, news-sheets, booklets, team-meeting minutes, team briefings, senior management 'state-of-the-nation' briefings, breakfast and birthday meetings and electronic mail). Communication must be by example, with management doing what they say must be done, and they must assess, on a regular basis, to ensure that the messages they wish to convey are getting through. Managers must recognize the difference between the art of communication and its medium. It also means that management must listen and act upon the views of those they manage.

10 *A formal programme of education and training should be established.* This is important in order to build the skills of employees, and should involve basic job skills and process training, including induction, TQM awareness, customer care, and training in the use of tools, techniques and systems. It must provide a common message and encompass the whole organization starting with the senior management team and members of the TQM steering committee. The training should also aim to identify potential improvement projects.

11 *The development of a training matrix* (see figure 5.2) helps to ensure that needs and capabilities are identified, along with the current level of awareness of TQM, quality systems, tools and techniques, etc. Training records also need to be maintained. The training matrix should be reviewed whenever an appraisal is carried out. Consideration should also be given to the concept of a 'learning organization': this would require an internal library of information and the appropriate training aids to be set up.

12 *An organizational infrastructure should be established which will ultimately facilitate local ownership of TQM.* Direction should be provided by the TQM steering committee, but the time it sometimes takes for people to accept

Person and function	Type of course and duration		
	General awareness	Specific (e.g. FMEA)	Degree of difficulty
Senior management			
Clerical			
Operator			

Figure 5.2 TQM training matrix

such ownership for TQM and continuous improvement should not be underestimated. Actions include deciding the membership of the committee, role and meeting frequency, setting up, as appropriate, local steering groups, identification of improvement co-ordinator (full-time or part-time), facilitators and team leaders, along with clear definitions of their roles, ensuring the means by which the actions developed by improvement teams can be carried through and agreeing budgets. In some companies it may be more appropriate for TQM steering committee-type issues to be discussed as an agenda item as part of management/board of directors meetings. Research by Dale and Boaden (1993) has shown that full-time support is essential in order to get the process going and establish a central pool of expertise, particularly in service or multi-site manufacturing organizations. The structure must be appropriate for the business situation. However, it is important that the improvement structure does not duplicate the existing management structure. If it does then questions must be asked about the latter. It is also recommended that the current organizational structure is assessed in terms of its suitability for starting and sustaining TQM.

13 *Teamwork should be established and become part of the organization's method of working.* In the first place it is suggested that a review is undertaken of any teams which are already established, in conjunction with their previous and current projects. Following this, task forces/project teams and cross-functional improvement teams should be established to address the major problems facing the organization, followed by the setting up of departmental improvement teams.

Systems and Techniques

This pillar of the framework involves the development of a quality management system to provide the necessary controls and discipline, and the standardization of improvements. It also involves the use of quality management tools and techniques to, for example, aid quality planning, listen to the 'voices' of customers, capture data, control processes, make improvements, solve problems and involve people. Key actions at this stage include:

1 *The tools and techniques applicable at different stages of the improvement process should be identified.* The areas/projects for the application of these tools and the conditions (organizational and people) necessary for the successful application of each tool and technique have to be identified. In the first place consideration should be given to identifying which tools and techniques employees are familiar with and those which are in regular use. Tools and techniques should be classified as core and optional, depending on their nature

and impact and the environment (e.g. manufacturing or service) in which they are being applied.

2 *The right type of training targeted at the right people should be developed; it should emphasize the why and how of the tools and techniques and the benefits of their use.* Many studies (e.g. Payne and Dale 1990; Dale and McQuater 1998) have demonstrated that the right type of training helps to stop the misuse of tools and techniques (e.g. SPC being applied in the wrong areas; only part characteristics being measured, used only for control purposes; lack of reactive disciplines, etc.). When tools and techniques have been used incorrectly, an additional set of problems in the introduction of TQM is created. Suitable training packages on tools and techniques should be developed and customized for the organization – this is perceived to be very important in some situations (e.g. public services). There is no correct 'formula' for training, since each organization will be starting from a different position and will have different needs, audiences, topics and views on the delivery mechanisms, but the superior-performing companies have well-developed, cyclical formal training programmes for TQM and have mechanisms in place for determining the effectiveness of the training.

3 *The use of a formal quality management system should be considered, if one is not in place.* If such a system is already in use, then some evaluation of its contribution to TQM is vital; the objective should be to continually improve and strengthen the quality system and ensure that any improvements are built into the system. The requirements outlined in BS EN ISO 9001 (2000) are a good starting point.

4 *Any other systems and standards which may be required as part of future contractual or legislative requirements, or simply in order to compete in certain markets, should be identified and implemented.* If relevant systems and standards are integrated with the improvement initiative it is less likely that the organization will have conflicting priorities and policies and confusion will be reduced. Examples include: ISO 14001 (2004), OHSAS 18001 (1999), Investors in People, Charter Mark, the Management Charter Initiative, National Vocational Qualifications, Environmental and Responsible Care programmes, and hygiene requirements. Ethical, social and political issues will also have to be considered.

5 *Process analysis and improvement should be a continual part of the organization's improvement process.* There should be a focus on processes (e.g. business planning and control and order generation) rather than functions within the organization. Process analysis and innovation gives emphasis to the centrality of quality throughout the business process and also focuses attention on customer and supplier relationships. Once key business processes have been identified along with their process owners, rationalization, simplification and identification of key performance measures can occur. This forms the basis for improvement, and despite the difficulties of implementing

such improvements when significant organizational restructuring may be necessary, it can yield significant business results.

Measurement and Feedback

This pillar of the framework enables the 'voice of the customer' to be translated into measures of performance with which the organization can identify, and on which it can improve. It also deals with internal measures of performance, supplier assessment and development and rewards and recognition. Key actions at this stage include:

1 *Key internal and external performance measures should be identified and defined to assess the progress being made with TQM, and to ensure that customers are satisfied.* The measurement process involves a two-way flow of information between the organization and its customers and suppliers, and these parties should be consulted as part of the process of deciding what measurements to make. However, it should be accepted from the outset that measuring customer satisfaction can be difficult and painful. For example, reading and developing responses to negative comments is not easy. Two key questions which need to be addressed in relation to feedback are: To whom is it made? and What level of detail is provided? When traditional financial and accounting-type data measurement criteria are evaluated in terms of their relevance to TQM it is often found that many of the existing indicators are inaccurate, unfocused, unconnected and seen as an end in themselves and therefore obsolete. Care must be taken to ensure that appropriate measures are developed, defined clearly and used. The chosen performance measures should help to facilitate the integration of TQM into the business processes of the organization and encourage all employees to focus on the key business and quality issues. It is suggested that an organization should consider the use of the 'balanced scorecard' method. This employs performance measures that contain different viewpoints and perspectives, typically representing customers, internal processes, continuous improvement and finance.

   The performance indicators must be monitored, displayed and communicated through debriefing sessions on a regular basis, thereby sharing the information with all employees. This also assists with renewing commitment when the improvement process starts to stagnate – 'If we cannot express what we know in numbers, we don't know much about it', and 'You cannot manage what you do not measure'. People are encouraged when they are able to see the results of their activities and efforts on key results areas and measures. This also applies to qualitative evidence such as photographs of shop

floor and office areas before and after a campaign to improve housekeeping. It is also useful to feed back data on typical mistakes and what long-term corrective action has been taken to avoid them being made again; any goals and targets established as part of this should be achievable. It is important to build results and corrective actions into improvement plans and standardize the improvements across the organization. Senior management must recognize that gathering data for external measures is time-consuming, and extra resources may well be needed.

Assessment of supplier performance and feedback of any measurements along with corrective actions is also a key feature of this pillar of the framework.

2 *Discussion with customers (internal as well as external) about the performance expected and their needs and expectations should be undertaken, using a variety of techniques.* This must be an ongoing exercise to ensure that gaps between actual performance and customer needs and expectations are identified and analysed, and actions put in place for closing the gap. In going about this exercise it is also important to assess the relationship between the sales and marketing functions and the strengths of each. The main objective of all this is to build a partnership with customers and to develop customer loyalty in order to build competitive advantage.

Issues that have to be considered in this marketplace research include:

- How well the organization is meeting customer expectations
- How well the organization responds to customers' comments
- How customers perceive they are treated
- The chief causes of concern to customers
- The main complaints from customers
- Suggestions the customer might have for improvements and what else may be required in terms of products, services and features
- How the organization rates against the competition
- Whether the data which have been collected are actually used to generate improvements which benefit the customer.

In some organizations it may be necessary to initiate suitable systems for identifying customer needs. Customers must also be encouraged and invited to challenge the organization which is delivering the product or service. The trend is for increasing the level of contact with customers (internal and external), and such 'moments of truth' occur far more frequently in commerce, public organizations and service-type situations than in manufacturing organizations (see chapter 11). Systems to identify customer needs include:

- Customer workshops
- Client service and call centres
- Panels and clinics
- Focus groups
- Customer interviews
- Market research

- Surveys: mail (including electronic), telephone, comment cards, point of purchase (survey designs should vary in length, contact and format)
- Trailing the service and/or product
- Field trials of new products
- Using 'test' consumers and mystery shoppers
- Feedback from professional and trade associations
- Product launches
- Field contacts

Often potential sources of information are customers lost and customers gained, the data which the finance and accounts department hold on customers, and field failure and warranty claims.

There must be a methodology and system for analysing and feeding back the data gathered from customers by such means (i.e. customer service measurement); the same applies to data on competitors.

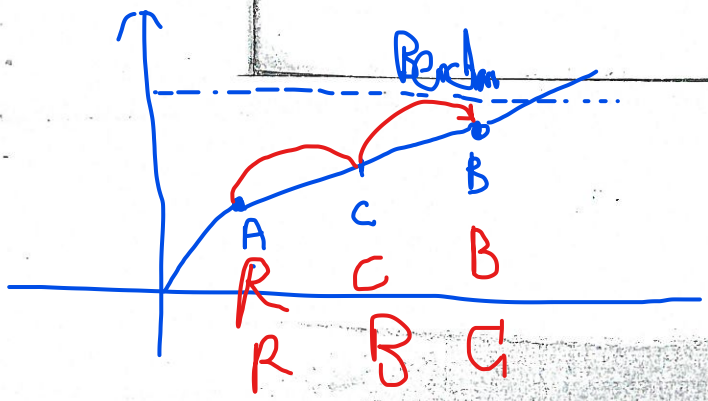
Goodman et al. (1996) report eight common pitfalls identified by Technical Assistance Research Programs Inc. (TARP) that undermine the integrity and value of customer feedback. These pitfalls are useful to keep in mind in tackling the issue of customer feedback data:

- Inefficient and costly data-collection
- Inconsistent classification schemes
- Old data
- Analysis in a vacuum
- Analysis without priorities
- Analysis that is not actionable
- Ineffective presentation of data and findings
- Failure to track the impact of corrective actions resulting from the voice of customer process

A considerable amount of useful guidance on understanding customer needs is provided by Gale (1994), McCarthy (1997), Vavra (1997) and BS EN 12973 (2000).

3 *Benchmarking should be considered once the organization has taken some steps to improve quality.* The benchmarking of a small number of strategic processes helps employees to see the need for change and thereby give impetus to the improvement process. The concept of benchmarking is a proven technique for assisting companies with a process of continuous improvement. It is a process whereby internal performance and practices are compared to those of other companies, including the superior-performing ones, in a bid to develop, improve and achieve the best practice that leads to superior performance (see Camp 1989, 1995, and chapter 21 below for details).

4 *Means of celebrating and communicating success with TQM should be considered, and methods developed for recognizing the efforts of teams and individuals.* The issue of ownership of TQM is linked to providing adequate recognition, rewards and incentives for quality efforts, and in this way the



message that quality is a strategic concern is reinforced. Two quotes worthy of mention are 'What gets measured gets done' (Anders Scharp, former CEO, Electrolux) and 'What gets rewarded gets repeated' (Anne Van't Haaff, former corporate quality manager, KLM).

Publishing successes is an effective means of communicating how people have tackled improvements. It helps to build up in people's minds that beneficial changes have started to take place, that things which at one time appeared impossible are now possible, and it helps convert the cynics: with published evidence of success they cannot say that TQM is not working – nothing succeeds like success.

Companies struggle in deciding how to recognize the efforts of teams and individuals for a job well done and often fail to think through the implications of their decisions in an adequate manner. Recognition and communication of success can be facilitated in a number of ways such as quality news-sheets, team briefs, quality action days, team competition/celebration days, quality conferences, presentations by the president and/or CEO, supplier award days, 'how are we doing?' boards, 'thank you' notes, small tokens of appreciation such as mugs, pens, meals, certificates and trophies, publicity in the company newsletter, personal thanks, applause, special functions (i.e. dinners, get-togethers, overseas trips, availability of company resources for personal use), and allocation of shares in the company; there is also recognition of performance by customers. Personal 'thank you' and 'praise' notes from senior management are often seen as a more genuine recognition than buying people through money. Townsend and Gebhardt (1997b) present some useful examples of successful recognition programmes which provide a range of thought-provoking ideas.

In some organizations people do not welcome individual recognition as they are made to feel uncomfortable by their peers, but in others tokens of recognition are desired and warmly appreciated. To help in deciding the most appropriate way to celebrate success it is recommended that views from employees are sought and the methods tailored to suit the needs of both the situation and employees.

5 *Linking rewards to improvement activities and results must be considered, although it is controversial.* Financial payment for participation in improvement activities, in particular, those schemes relating to individuals, should be discouraged but perhaps not overlooked. Continuous improvement should be a natural part of every person's job, but people at different levels of an organization have widely differing expectations of what improvement means to them personally and to the company. There is a view, however, that 'links to pay and promotion may still be the most tangible proof that top executives take total quality seriously' (see Troy 1991). An Income Data Services study (IDS 1991) concentrated on those incentive schemes in which quality or customer service are major determinants of bonus payments. It concluded

that few companies have sought 'to make a direct link between quality or customer service targets and then payment'. The study did go on to describe how Rank Xerox, Elida Gibbs, Scottish Widows, Companies House, British Steel and 3M have linked bonus payments in this way.

If there is pressure within an organization for financial payment perhaps it could be approached through a Japanese-style suggestion system, or along the lines of the Improvement Opportunity Scheme as described by Piddington et al. (1995). Organizations and individuals have different perceptions of the value of suggestion schemes. Among the common complaints are: 'We did not get any feedback so we are not going to make any more suggestions' and 'The response time to the suggestion was too long'.

6 *Means of assessing the progress of the business towards world-class performance should be used.* For example, the MBNQA criteria for performance and the EFQM excellence model should be considered (see chapter 24).

Changing the Culture

Organizations attempt to change culture for different reasons. Changing the culture is a key element in TQM and has wide-ranging implications for the whole organization; it requires the introduction and acceptance of individual, group, and organizational change. TQM provides the opportunity to make and influence behaviours and attitudes which have real effects on internal and external relationships and the way the organization conducts its business.

Culture change is not just relevant to TQM, although the increased emphasis on customers and their needs makes some form of culture change a must for most organizations. There is, however, a shortage of information and guidance for companies looking for ways to change, plan and facilitate culture change. The change of culture must be planned to avoid ambiguity and facilitate improvement; managers must learn to lead change and useful advice is provided on this issue by Adebanjo and Kehoe (1999), Atkinson (1990), Kanter et al. (1991), Schein (1985) and Tichy (1983). The current status from both management and employee perspectives should be established before firm plans for change are developed.

It is not possible to identify key actions for this stage, but there are a number of features which should be considered:

1 *An assessment, from both management and employee perspectives, of the current status of the organizational culture should be undertaken before firm plans for change are developed.* Senior management must be prepared to resolve conflicts, and resistance to change which is identified in the assessment; the personal values of staff and their expectations sometimes present a problem.

2 *Culture change must be recognized as ongoing, rather than as a prerequisite to the introduction of TQM.* Some degree of culture change in terms of senior management commitment and leadership and provision of adequate resources must, however, take place prior to and as part of the organizing stage. For example, the effective use of tools and techniques, developing the quality management system to meet the requirements of the ISO 9000 series, teamwork, the impact of successful improvement projects, presentations, recognition, effective channels of communication, etc. are all activities which can contribute to culture change. There are of course other activities which will contribute to the culture change process (e.g. improving the environment in terms of provision of uniforms and safety shoes, team meeting rooms and lockers) which may not connect directly with TQM and the improvement process. The crucial factor is a recognition of these activities and their contribution to culture change. In planning any changes it is useful to develop thinking along the lines of 'Where are we now?' and 'Where do we want to be?' Middle management must be involved in the planning process, since the burden of change falls on them. Management must create the culture which all employees believe in.

3 *Change should be planned and take place in a consistent and incremental manner.* Experience indicates that if the change is too great and unplanned the organization will revert back to the status quo. Clear and public displays of key indicators and 'how are we doing data' help to ensure that the changes which are made are real and that no slippage occurs. While there may also be some unexpected outcomes, they are no substitute for planned change.

The planned changes must be outlined in specific terms and, where possible, qualified against a time-scale. Employee attitude surveys, customer surveys and internal customer–supplier workshops are also useful for identifying culture change indicators. Examples of possible changes include:

- Create a single-status environment: harmonize conditions and eliminate other traditional status symbols, such as reserved car-parking spaces, different types of dining facilities, different terms and conditions of employment (i.e. move blue-collar sick pay towards that of staff) and other forms of demarcation (i.e. seasonal gifts being shared rather than going to individuals).
- Reduce the number of organizational levels.
- Delegate decision-making and the responsibility for taking actions down to the lowest possible level and spread the power base.
- Senior managers meet employees of all levels on a regular basis.
- Teach managers to adopt a listening, consulting and learning style of leadership.
- Enable every employee to visit a customer and other parts of the business.
- Operator exchange programmes.
- Operators to 'brief' customers during customer visits to the sites.

- Develop a requirement for senior management to spend a specified amount of time with people at the operating level of the business.
- Require the CEO to attend one meeting of each active quality team on an annual basis.
- Train managers to act as trainers.
- Change the payment system to one which recognizes issues such as the team, acquisition of skills, flexibility, etc.
- Replace supervision by leadership and give staff more freedom to get on with the job.
- Introduce the concept of associates rather than employees.
- Make it possible for operators to move between jobs within the business.
- Introduce cross-functional team activity.
- Provide opportunities for management to listen to the views of staff and customers and develop a listening and learning style of leadership.
- Get staff to tell management where they are going wrong. It is important to put into place a mechanism for ensuring that this happens, and providing guidance to staff in how to go about it, and to management on how to handle such feedback.
- Change to a cellular type of organization.
- Recognize and respect people's contribution to the business.
- Provide financial education for everyone.

The grid shown in figure 5.3 can be used to classify the degree of difficulty of each change and its effects.

4 *The role of people within the organization should be recognized.* The way that they are treated is vital, since they are an intellectual asset whose value to the organization can be increased by careful nurturing or decreased by poor management. It should also be recognized that most organizations are made up of people of differing ages, backgrounds, skills, abilities, levels of enthusiasm, levels of flexibility and ability to accept change (in some industries, tradition is very deep-rooted and this presents a specific set of resistance-to-change difficulties). If culture change is to be successful these people-based

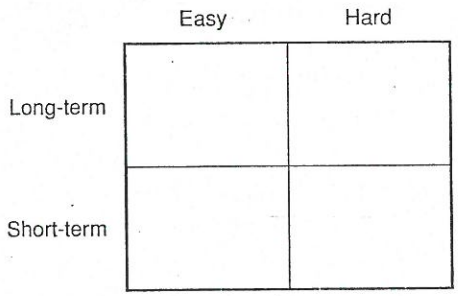


Figure 5.3 Culture change grid

factors must be taken into account. The means of developing and involving people must be identified; a skills audit is a useful starting point for this. The Investors in People programme provides useful advice on people development.

5 *Teamwork is an important facilitator in culture change, but organizations must ensure that the organizational infrastructure can adapt to the changes which teamwork will bring.* The operating characteristics of the teams to be employed in TQM should be defined and communicated (see chapter 23). It is also essential that participants in teams and other improvement activities are volunteers, not 'conscripts'.

6 *The interrelationship of all activities in the organization, and the way in which they contribute to the overall quality of service and product provided, should be identified, so that conflict is minimized and TQM becomes part of the way in which the business is run.* Such conflict typically arises at middle management level, where the impact of strategic initiatives meets the problems of day-to-day running of the organization. In any large organization there will be a variety of initiatives going on at one time, many of which will affect staff directly (e.g. installation of new computer systems, development of information technology, introduction of Manufacturing Resources Planning (MRP II), cost-cutting exercises, marketing promotions), and these may indirectly contribute to the quality of product and service provided. It is important that management and staff understand the relationship between these and formal improvement initiatives, otherwise they may be perceived as being in conflict, and thus not achieve the desired outcomes. A case in point is a strain on resources resulting in people not attending quality team meetings.

7 *Factors which indicate that TQM has started to change culture should be identified.* Without such factors it is difficult to know whether culture change is taking place, and the concept may be undermined by 'lack of results'. Factors that indicate that culture is changing include:

- People see for themselves the need for tools and techniques.
- Motivators and champions start to emerge from various parts of the organization.
- People talk processes and not functions.
- Changes to procedures and systems are easier to make.
- People are not afraid of expressing their views.
- People show a positive response to recognition.
- Employees are viewed by senior management as an asset and not a cost.
- People volunteer to take on tasks which would previously have involved considerable negotiation between management and unions.
- Shop stewards help management to explain new procedures.
- People asking for their setting-up activities to be videotaped in order to reduce the machine down time.
- Ideas and suggestions start to flow from the shop floor.
- Willingness to serve others.

- Team meetings scheduled outside of team shift, without pay.
- Improvement teams ask management to suggest project themes.
- The distinction between the 'manager' and the 'managed' becomes hazy.
- Senior management shift their attention from TQM to concentrate on other things and improvement activities continue.
- Continuous improvement goes on in the face of organizational instability.

8 *In planning for change thought needs to be given to the culture of a country and its people.* A national culture is a set of shared values, beliefs and behaviours which binds people into a relatively cohesive group. However, there may be subcultures (i.e. local cultures) within countries. Details of national culture are provided by Hofstede (1984) in terms of four dimensions – power distance, uncertainty avoidance, individualism and masculinity. For example:

- Companies in Hong Kong are characterized by paternalistic leadership, power distance and, to some degree, risk avoidance by employees. In Hong Kong there is also a tendency for Chinese people not to be open in reflecting opinions and ideas: they tend to look first for personal monetary reward and benefits. Such attitudes can be in conflict with culture change, which is a longer-term process.
- In South Africa there are a number of issues which have to be considered such as the political/union situation, the use of traditional leaders in an ethnic sense, the inherent suspicion of management by the workforce as a result of historical and political factors, the characteristics of both first and third world cultures and concepts, racial integration of personnel by means of positive assertive actions, and the eleven official languages.

In addition the cultures of different industry types, which are often quite strong, need to be taken into account.

Use of the Framework

The framework should be used as part of an eight-stage process:

1 *Review the organization's adoption of TQM to date.* This should include a presentation by senior management on the progress to date and future plans. The grid shown in figure 5.4 can be used for pinpointing the current position and the features of the four first four levels of the TQM adoption model (see chapter 6) – 'uncommitted', 'drifters', 'tool-pushers' and 'improvers' – are also of help in positioning an organization. This stage can take the form of a TQM awareness session if the business is relatively immature in its adoption of TQM.

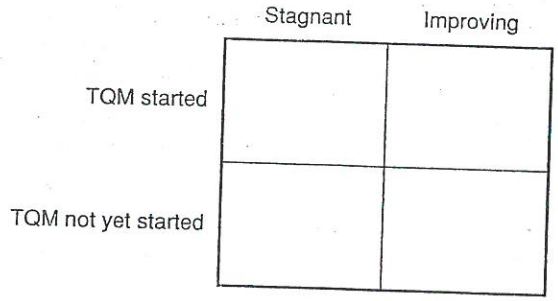


Figure 5.4 TQM grid

2 *Customize the framework to suit the individual organization.* In the first place, a full presentation of the framework is made to the participants. If the framework is being developed for a single organization, the senior and middle managers are divided into syndicate groups and tasked to consider the features of each section of the framework and customize it to suit the individual organization and its business. If the framework is being used in an open workshop session, and the participants are from manufacturing industry, the syndicate groups can be organized either by size of organization or type of industry. If they are from a mix of sectors they can be organized by sector (e.g. manufacturing, transport, financial, public sector, health care).

3 *Present and debate the customized framework.* A spokesperson from each syndicate group makes a presentation on the framework they have developed, with the features of each group's framework being debated in open forum. In the case of a single company a consolidated framework is developed, based on what has been agreed in the discussion arising from the open forum. If the syndicate group comprises a number of different companies, the participants can take the framework back to their own organization and either debate the framework with their management team and add or delete features as appropriate or repeat the syndicate exercise as a single management team.

4 *Assess which features of the framework are already in place.* Self-audit surveys and internal and external indicators can be employed. A number of methods of measurement can be used, for example, ranking each feature on a 1 to 6 scale or the use of a yes, no, in-part classification (figure 5.5 shows an example of this).

5 *Prioritize the features which are not already in place.* This should be done in accordance with the overall strategy and business plans of the organization. In some cases an organization may wish to accept this generic framework as it stands, thereby skipping steps 2 and 3. The way that this had been handled is to present the organizing section of the framework to the management team and get them to undertake steps 4 and 5 above. This is repeated for the other three sections.

Culture Change Section	*Yes*	*In part*	*No*
Commitment			
– Senior management	•		
– Visibility		•	
Current status			
– Questionnaire			•
Employee involvement	•		
Training and people Development			
– Customer appreciation	•		
– Appraisals/objectives	•		
– Skills audit			•
Conditions of employment			•
People environment			•

Figure 5.5 TQM framework: feature assessment

6 *Develop plans to introduce the prioritized features of the framework identified in the previous stage.* The plans should have a start and finish date, with detailed actions, milestones, resources and responsibilities.

7 *Communicate the details of the framework and the plans derived from it down through the organization.* This helps to gain acceptance. The framework should also be communicated to suppliers and customers.

8 *Identify any potential problems in putting the plans developed at stage 6 into place.* Some typical problems encountered are: lack of structure and how to formalize the existing organization in relation to current management roles and responsibilities, lack of trained personnel, definition of terms (e.g. customer response time), conflict of barriers, traditional attitudes, time conflicts/constraints and constructing a real and meaningful mission statement which can be owned.

The format shown in figure 5.6 can be used as part of this process.

Features Vision		*Plans*				
What will it look lile?	What does it involve?	What is the current situation?	What needs to be done?	Who is going to do it?	What is going to be done?	What are the obstacles/issues?
1						
2						

Figure 5.6 TQM framework: organizing section

Summary and Outcomes

The following are the outcomes derived by those organizations who have used the framework:

- Developing the framework provides a mechanism for debating TQM and continuous improvement strategies, plans, actions and initiatives and helps to generate a common level of understanding and reconcile views and opinions. It also assists management in identifying the factors which can slow down the process of improvement (e.g. inconsistent objectives, insufficient involvement and ownership, lack of data, lack of operator involvement, failure to complete projects, break-up of improvement teams, etc.) and helps to pinpoint and eradicate weaknesses in the current TQM approach of the organization.
- The framework, once developed and customized, becomes a reference point for current and future improvement initiatives. It builds on the quality initiatives already in place and guides the organization's development of TQM in a formal manner.
- Use of the framework requires all members of senior and middle management to be involved in the planning process, thereby developing ownership of the resultant plans. The prioritization of the framework features, in conjunction with business and commercial needs, against a time-scale helps to ensure that TQM is part of the business planning process and integrated with other strategies.
- The framework provides a means of communicating, in the organization's own language, what is involved in TQM and provides the essential logic of why the organization is adopting and progressing TQM and what is involved. It ensures that discussions on improvement are both structured and specific.
- In a multi-site operation the framework provides a common approach and language for all businesses, and those likely to be acquired in the future. In this way it avoids confusion with common suppliers and customers and presents a consistent approach and TQM image to both employees and the marketplace. It helps understanding of what each site has achieved in relation to TQM, assists in taking policy decisions (e.g. individual or common vision and mission statements, specific sites taking the lead role in piloting training programmes, quality management tools and techniques, etc.) shares common experiences, and highlights the availability of resources, mutual assistance, training, expertise, experiences, etc. It also helps those businesses which are less advanced in terms of TQM to discuss in a coherent manner common issues of interest with those that are more advanced (i.e. the common language and approach helps to facilitate 'technology' transfer).

- It provides the means for the local management committee and/or the TQM steering committee to assess the progress made by businesses against the plans developed, and ensures that issues are followed through. In undertaking this task problems can be identified and appropriate counter-measures developed.
- It can be used not only to assess the maturity of TQM but to audit whether or not certain features of the framework are firmly in place. In this way the next set of priorities can be identified.
- The correct use of the framework ensures that an organization puts in place the key features of TQM and a process of continuous improvement. Many of these fundamentals are encompassed in the 'TQM packages' offered by consultants. Thus an organization which feels it needs some 'outside' assistance can introduce and start a process of improvement without necessarily going to the expense of employing a management consultant. The use, if any, of a consultant could come later in the process when more specialized and detailed advice is required.

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Chapter Six

Levels of TQM Adoption

B. G. Dale and D. M. Lascelles

Introduction

From research work carried out world-wide on the subject of TQM by the Manchester School of Management at UMIST during the last 20 years or so, it is clear that the extent to which organizations have adopted and committed themselves to TQM as the ethos of the business is variable. Six different levels of TQM adoption (or lack of it) have been identified, which are termed:

1 Uncommitted
2 Drifters
3 Tool-pushers
4 Improvers
5 Award-winners
6 World-class (see figure 6.1)

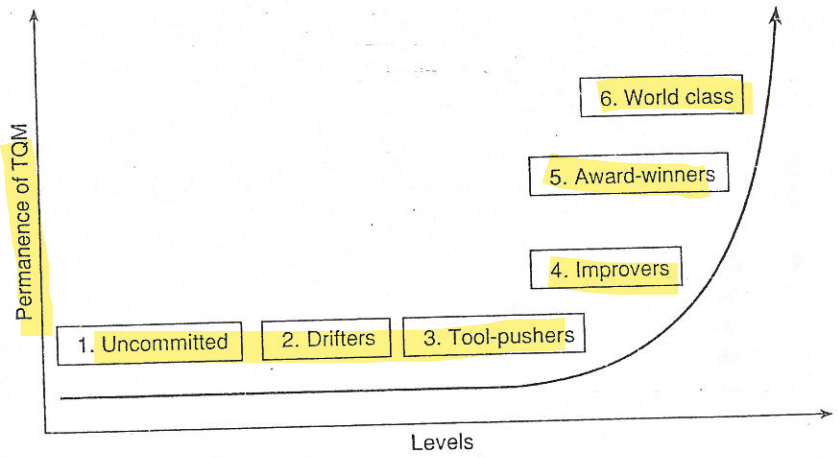

Figure 6.1 Levels of TQM adoption
Source: Lascelles and Dale (1993)

These levels of TQM adoptions were first derived by Dale and Lightburn (1992) from empirical observation, and were later refined by Lascelles and Dale (1993). The descriptions underlying each of the levels have since been tested by Dale in a number of workshop sessions for senior management in Europe, Hong Kong and South Africa. The initial descriptions of each level have been refined and added to from this testing and the current descriptions are reported in this chapter.

These levels are not necessarily the stages through which organizations pass on their TQM journey; rather, they are characteristics and behaviours which organizations display at one point in time in relation to TQM. While there are obviously exceptions to these generalized descriptions, with some organizations mid-way between two of the six levels, displaying hybrid characteristics and behaviour, it has been found that these six levels are a useful way of characterizing organizations and helping them to recognize symptoms and develop plans for the future. This positioning has also been found useful in helping to understand how people from a variety of hierarchical levels view the organization's TQM maturity. Some organizations, in using the levels as a TQM positioning model, have assigned a set of values (i.e. using a Likert-type scale) to each of the statements which highlight the characteristics and behaviour for each level, thereby quantifying the perceived level of their TQM adoption.

The six levels are now described.

Level 1 – Uncommitted غير ملتزم

Level 1 organizations are those who have not yet started a formal process of quality improvement and, in some cases, can be considered as being ignorant of TQM. Their quality initiatives are usually limited to gaining ISO 9001 quality management system registration and perhaps applying a few quality management tools and techniques as a reaction to customer pressure. The extent to which both systems and tools and techniques have been applied is often directly related to the amount of time spent by the client representatives on site, closely monitoring their use. The ISO 9001 quality management system will be seen by employees as a quality system and not a management tool. The quality department will be driving the quality management system and the keeping of ISO 9001 registration is totally dependent upon their efforts. The success of quality system audits by second- and third-party agencies will be viewed by senior management as an indication of the success of the company's quality initiative. The business will be operating in a detection mode (see chapter 1), but senior management believe a preventative approach is in place.

In this type of organization much talk is likely to be heard on topics such as productivity gains, financial indicators, and ISO 9001 and other customer

certificates of registration. Quality improvement is seen both as an externally imposed contractual requirement and as an added cost – a twin threat to be avoided whenever possible. Quality is not given priority in terms of either managerial time or resource allocation. The focus will be on the product not on the process, and corrective and preventative action will not be taken intuitively but only in response to client/customer complaints. The priority is given to fire-fighting situations.

(3) Problems are given support for their resolution subject to the level of impact which they may have on sales turnover. In this respect, failures and non-conformances encountered prior to shipment of product will receive the greatest attention, while those which have occurred after the product has been delivered and those problems which have arisen over a period of time will receive progressively less attention. It is also likely that the quality of design in terms of product, service and process will not receive the necessary and appropriate attention at the right time.

(4) Little investment in the education and training of management with respect to quality will have taken place, and managers consider themselves to be above this type of training. Consequently, senior managers in this type of organization are reluctant to take responsibility for or get involved in improvement activities. Evidence of this lack of commitment usually surfaces strongly in an ISO 9001 implementation programme. It is usual to find that management makes time available at the beginning of the programme, but as it progresses the attention given will diminish (e.g. non-attendance at meetings, failure to respond to requests for data, and not doing what they had agreed to do).

(5) It is likely that this type of organization will have had some bad experience of TQM or one of its elements, in the form of a programme (i.e. quality circles, ISO 9001 registration, empowerment) and consequently the concept will have acquired a less than favourable reputation amongst the senior management team. Some managers will associate TQM with unreasonable demands on them and their time and see it as a costly and bureaucratic system which will limit their autonomy.

Level 1 organizations are termed 'The Uncommitted' because they have no long-term plan for continuous improvement and are not convinced of its benefits. Managers, particularly at senior management level, are usually ignorant of the philosophy and values of TQM, and if they do have some knowledge of the concept they may be sceptical as to its relevance for them and their business. Any knowledge that has been acquired has come through informal sources. They are not necessarily small, immature, unsophisticated or owner-managed organizations. Some 'household name' organizations are at this level and are often characterized by a long and successful trading history with little effective competition and a lack of customer pressure (i.e. market-niche products, protected markets and contracts assured which are subject only to the budgetary constraints of the client).

Particular characteristics of Level 1 organizations include:

- An overwhelming emphasis and gearing of activity on return on sales and net assets employed, at the expense of other measures, both financial and non-financial.
- Meeting output and sales targets is the major objective of the business, whatever the cost.
- There will be a lack of quality assurance and behaviour-regulating systems, and as a consequence alternative methods will be employed to ensure that unrealistic production targets are met. These methods, more often than not, result in quality aspects of the job being discarded, resulting in a high incidence of internal and external failure.
- A pervading attitude of short-termism as evidenced by frequent changes of priority, lack of investment in people, technology, research and development, and infrastructure and cost-cutting.
- The company is inward-looking and its management style tends to be autocratic and 'lean and mean', with senior management having sole discretion and decision-making responsibility.
- The potential threat from the competition is not recognized.
- A number of negative elements are embedded in the organizational culture (e.g. 'them and us' attitudes, a limited view of 'on-the-job' expertise, inflexible working practices, job demarcation, little recognition of the potential of individuals, individuals are chastised in front of both their peers and subordinates and not given a chance to defend themselves, employees are required to wear identification tags to provide visual proof to management that they belong to a specific area, and managers enforce their ideas upon staff to a point where they are not allowed to think or deliver any input to decisions).
- The majority of employees have little concern for quality: it is seen as someone else's job. Employees are not held responsible for the quality of their output. A typical scenario is that inspectors find the defects and workers fix them.
- People hijack ideas and proposals from other employees to ingratiate themselves with management.
- When quality improvement proposals and suggestions for change are made they are either squashed, not understood or changed to suit management's needs, and there is an unwillingness to instigate any real changes.
- One hundred per cent inspection is carried out on incoming materials, at key points during the production process, and on the finished product. The main focus of the activity is to measure conformance to specification and a considerable amount of activity revolves around the acceptable quality level (AQL) concept.
- The data collected from tools such as check sheets and quality control checks tend to be left on file with no effort to identify trends and highlight major non-conformances.

- Ineffective and inaccurate corrective action control procedures.
- A piecework system is in operation for operatives and inspectors, with payment made for non-conforming work.
- Any quality improvement initiatives tend to be 'bottom-up' and are product-related.
- The same problems recur with no formal procedures for pursuing long-term corrective action.
- Processes are not fully understood, documented and/or accessible.
- Employees are encouraged, when things go wrong, to make all efforts to 'cover their backs', and if blame can be passed on to alleviate pressure then it is done without a thought for others. This type of action is condoned, if not encouraged, by management.
- Contact with customers is minimal.
- Suppliers are often blamed for quality problems, although the majority of the problems are of the company's own making.
- A lack of communication up and down the organization.
- Management and people are driven by fear and uncertainty. For example, in a plant of one of the UK's top-performing companies (in profit terms) a defective batch of product was hidden from the plant director by the works manager and a production supervisor so that they could dispose of it when the director was off-site. Another typical example of this characteristic is the unwillingness of all levels of personnel to express their opinions and ideas in the presence of their manager/director.

It could be argued that such companies, which are often very profitable, do not need TQM when they seem to be doing very well without it. But 'doing very well' is only for the time being and may not be a long-term phenomenon. Certainly, with rising costs due to inefficiency, they will in the future begin to suffer. Such uncommitted companies and their business philosophies are 'dinosaurs' belonging to another age; 'They are unlikely to survive the new economic age' (Deming 1982).

Level 2 – Drifters

Level 2 organizations will have been engaged in a process of continuous improvement for up to three years and have followed the available advice and 'received wisdom' on TQM. The management team will be taking stock of the progress made and it is also likely that initial enthusiasm will have worn off so that ways of reviving the process are under consideration. At this stage, those with a short-term view may be expressing disappointment that TQM has not lived up to their expectations, asking questions such as 'What comes after

TQM?' 'What do we need to concentrate on next?' 'What is the next fad?' 'Should we be using business process re-engineering?' 'Should we use the EFQM excellence model?' This type of organization is susceptible to the latest fad and this focus is detrimental to the development of an in-depth understanding of the fundamentals of key concepts. For example, in one utility some management believed that quality was being introduced into their processes by re-engineering them and therefore considered that there was no need for an ISO 9001 quality management system.

Senior management perceive that the motivation of employees can be improved but think that this is being suffocated by their supervisors and managers. To facilitate this motivation a form of empowerment programme is put into place, and some senior managers express the belief that this will replace TQM. It will also be assumed by senior management that – in spite of their lack of visible involvement in TQM, recognition for the improvements which have taken place and failure to prioritize improvement activities – continuous improvement will be naturally self-occurring and self-perpetuating.

This type of organization may have followed a programme along the lines of Crosby's 14 steps (1979; see chapter 3 above). Having reached Step 14 – 'Do it all again' – they do not know what to do next and are wary of 'doing it again' because the initiative taken to date has not been perceived as universally successful throughout the organization. In the case of a service, commercial, or public-sector organization they may have started with a customer-care programme, perhaps in a blaze of publicity. It is not unusual to find organizations at this level seeking to employ the philosophy of one of the other quality management experts – a typical comment being 'We started with Crosby and are now viewing the Juran videotapes to see if his philosophy is suitable for our next step forward' – or be considering the use of the EFQM model, taking the line 'This is evidence of our commitment to TQM.'

There is a danger that this type of organization enters a cycle of programme renewal and decline, moving in ever-decreasing circles of false starts, waning enthusiasm, frustration and disappointment.

The characteristics of Level 2 organizations include:

- Continuous improvement is still perceived as a programme, not a strategy or a process, and will have a low profile within the organization. It will not be integrated with business and departmental objectives.
- There is no plan for deployment of the TQM philosophy throughout the organization. Communication is limited and TQM does not penetrate to shop-floor and office levels.
- Management are overly susceptible to outside interventions and easily get distracted by the latest 'fads' which are put to them under various guises (i.e. they are quality fashion victims).
- Management have unduly high expectations of ISO 9001 and fail to distinguish between meeting this standard and TQM. It is also likely that the

procedures of such a system will be cumbersome; control and disciplines engendered by it will have been allowed to slide and documents will have become obsolete, resulting in a superficial application. While there is a belief that staff should work within the system, management cannot accept that they themselves need to accept the same disciplines. Consequently, at first-line supervision and operator levels they tend to be driven by day-to-day actions and quotes rather than compliance with quality management system requirements.

- The quality department has low status within the organization.
- Continuous improvement activities are little more than cosmetic 'off-line' motivation programmes, with little impression on the company's organizational structure, internal relationships, and overall business direction.
- There is inadequate reporting of defects and inaccurate and/or inappropriate feedback, and there is a lack of clarity on what the real non-conformances and defects are.
- The softer aspects of TQM will have been promoted without the underpinning and mastering of the quality assurance basics.
- Any team working is superficial and departments only tend to co-operate in order to lay the blame on another department. Considerable in-fighting, rivalry and 'politics' exist between departments.
- A programme of quality circles will have been attempted as a means of developing employees, and middle management told that they are judged by the number of quality circles they have in operation. The initial circles will have flourished, after which they will have floundered and then virtually died.
- No real changes in corporate culture have been made since the start of the TQM initiative. The activities associated with TQM are not given time to come to fruition before they are discarded and replaced by others.
- There is a reasonably high degree of suspicion and scepticism about TQM by management and staff, with a number of senior and middle managers not accepting the concept of TQM. Those at an operating level see TQM as another short-term tool to squeeze more productivity out of them.
- There are gaps in people's understanding of TQM and what it is, and, in addition, some key elements of the improvement process will have been treated superficially. This will not have been helped by an unco-ordinated training programme. A typical scenario is that awareness of TQM exists at the lower levels of the organization, and understanding of the benefits is turned into frustration because they do not get the support of senior management, because they lack of knowledge of the concept and do not understand the seriousness of the situation facing the organization.
- There is a wide gulf between levels of the organizational hierarchy in perceptions of TQM, benefits achieved and progress to date.
- Self-assessment has been performed against one of the recognized award models, but the areas for improvement identified have not been addressed by developing a time-scaled plan of action. The focus of the self-assessment

exercise is likely to have been on scoring mechanisms, 'scoring points' and impressing customers and suppliers, and not on how to facilitate improvement, and is perceived by many in the organization as being of little practical value. There is an overwhelming desire to win a quality award, mainly for PR and marketing reasons.

- A fear of failure and uncertainty pervades the organization and there is the view that TQM will be sidelined in the medium term.

- Level 2 organizations are termed 'The Drifters' because they drift, without a clearly defined baseline, from one programme to another in a stop-start fashion, with concepts, ideas and initiatives being reborn and relaunched under different guises. Management teams try a variety of approaches, often in response to the latest trend, consultancy input, what they perceive will impress customers and what has been gained from conference presentations and discussions with other companies. A change of approach may be sparked off when a senior manager who has been a protagonist of the TQM philosophy and a particular line of thinking leaves the organization. Individual initiatives may be very creative because the managers are intelligent and articulate people, and some will be genuinely committed to and enthusiastic about TQM. However, while they are unable or unwilling to place quality improvement within a strategic business framework, it will not yield the desired long-term results.

Level 3 – Tool-Pushers

A Level 3 organization has more operating experience of quality improvement than a drifter, usually between three and five years. They will typically have ISO 9001 registration and/or have met the requirements of the quality system standard of one or more of the major purchasers. They employ a selection of quality management tools and techniques such as SPC, the seven basic quality control tools, quality circles, FMEA and mistake-proofing, use a variety of quality improvement groups, and may be in the process of extending their knowledge of some of the more advanced techniques such as design of experiments, QFD and the seven management tools.

It is not uncommon to find that the training on tools and techniques has been aimed at individuals who cannot propagate their further use and application, hence the knowledge is contained. The system certification and use of tools and techniques will usually have been prompted and forced by a customer-driven initiative or based on the initiatives of individual employees. In some cases the tools and techniques will not have been implemented in a strategic and systematic way, but reactively and when necessary. An increasing number of organizations at Level 3 are also looking to the criteria of the TQM and performance and excellence

models of MBNQA (US Department of Commerce 2005) or the EFQM (2006) to provide an indication to senior management of what is involved in TQM and give some direction and structure to their improvement process, the quantitative assessment of progress being perceived as of particular benefit.

A detailed examination of the quality assurance procedures, quality planning systems and the use of quality management tools and techniques reveals that, in the main, they are being employed with an almost militaristic mindset (i.e. exacting and stringent quality requirements have been set by the customer and as a result a regulative approach has been built around fulfilling them).

If the organization is owned by an offshore parent company, it is likely it will have made an attempt to address the annual themes in its officially submitted business plans and will have responded to the improvement initiatives put out by regional and corporate headquarters. However, there will be no master plan to integrate and sustain the various initiatives which have been downloaded by headquarters to the various operating businesses.

There are a number of Level 3 organizations which have purchased a particular quality improvement tool (e.g. the Juran training videotapes) and then followed the recommended advice – i.e. training by module, establishment of problem-solving teams, project-by-project improvement, etc. However, even though some of these teams have been highly successful, after a period of up to two years the impetus of this type of training has been lost and the Juran training methodology has fallen into disuse. Such companies buy tools, training packages, programmes, etc. and disregard them once the novelty has worn off, thereby failing to realize the potential afforded by the tool by neglecting to link it into a continuous improvement strategy. It is often the case that the tool itself is then blamed as 'ineffective' when in reality it was its incorrect application which caused it to fail.

The characteristics of this type of organization are:

- They are for ever looking for the latest panacea, for a 'quick fix'. This has happened with quality circles, SPC, FMEA, design of experiments, QFD and benchmarking. The excellence models and BPR are now being used in this way by many organizations.
- Not all members of the senior management team are committed to TQM and those that are will probably not understand its full implications, with considerable variability in their knowledge of the subject. The different interpretations placed on the concept are sometimes wanted and built upon by management to disguise their lack of commitment to TQM. Some of these senior managers do not see it as their responsibility to facilitate improvement, but have a 'What's in it for me?' attitude. This surfaces in the form of autocratic and negative behaviour, particularly in the sales/marketing and finance functions. They have a tendency to delegate TQM responsibilities to the quality department (e.g. customer complaints, issues revolving around administration errors such as pricing, invoicing, duplication of orders,

over- and under-supply, and chairing ISO 9001 review meetings). Middle managers may say all the right things, but they remain unconvinced in their own minds of the value and strategic importance of TQM, and demonstrate this in their day-to-day actions. In their area of responsibility they give priority to systems and techniques which they consider will have more short-term impact than TQM. These apparently conflicting priorities are communicated through their actions and comments to first-line supervisors and operators, where the understanding of TQM and continuous improvement is usually patchy.

- The continuous improvement effort is concentrated in the manufacturing/operations departments, with other departments remaining less involved in improvement efforts. The tools and techniques will be in a reasonable state of health in those areas most affected by customer audits. The quality department is usually the main driving force of the improvement process, and company employees perceive the department as owning quality assurance and quality improvement. There will also be a perception within the quality department staff that they themselves own the continuous improvement process.
- A certain amount of inter-departmental/functional friction and lack of communication is likely to be evident.
- Detailed quality procedures are in place and the focus is on control of what exists now. The emphasis is on solving current rather than future problems.
- A quality management information system will exist, but the data provided by the system will not be used to its full potential.
- Meeting output targets is the key priority of the majority of managers, with conflict between the manufacturing/operations and quality assurance departments.
- Short-term results regarding product output and quality are expected, resulting in reactive problem-solving and a neglect of long-term, root-cause, process-improvement actions.
- The management style is reactionary.
- Organizations have acquired a reputation for their products and services but their processes have considerable potential for improvement.
- There are repeated claims from some parts of the organization that TQM is not working, with a tendency to dwell on old practices as being more effective.

This type of organization finds it very difficult to sustain the momentum of its improvement initiatives and is continually on the look-out for new ideas and quick fixes to deploy. The practice followed is often to replace those quality management tools and techniques which have been found to require considerable effort and disciplined application to make them work. The fire-fighting culture tends to suppress those techniques which need more effort to use and apply them successfully. A Level 3 organization gives the right kind of signals and presents the requisite image to its customers and suppliers, but under the surface a 'fire-fighting' culture remains, which is not really committed to TQM.

There are a number of similarities between Level 2 and Level 3 organizations, in that TQM has not affected the pervading organizational culture or achieved significant business results. The difference lies in the way in which organizations react to this, with Level 2 organizations trying a new overall approach, while Level 3 organizations merely turn to another tool or technique within the context of the same overall approach. Level 3 organizations more commonly have well-developed quality management systems, and tend to be concentrated in the manufacturing sector.

Level 4 – Improvers

Level 4 organizations will typically have been engaged in a process of continuous improvement for between three and eight years and during this time will have made important advances. They understand that TQM involves cultural change and have recognized the importance of customer-focused continuous improvement. The chief executive and members of the senior management team have committed themselves to total quality through leadership and their own personal actions. They will have formulated a strategy for TQM, in conjunction with the other business strategies, and have implemented a good deal of it. It is at this level that TQM begins to have a real impact on business performance.

Characteristics of this type of organization include:

- A policy deployment and problem-solving infrastructure is in place, together with a robust and proactive quality system.
- There is a high degree of closed-loop error prevention through the control of basic production/operation and/or service processes.
- A long-term and company-wide education and training programme is in place.
- Process-improvement activities exist throughout the organization with people looking to improve activities within their own sphere of influence, on their own initiative.
- The importance of employee involvement through a variety of departmental and cross-functional teams and other means is recognized, communicated and celebrated.
- Benchmarking studies have been initiated and the data are used to facilitate improvement activities.
- A 'leadership culture' is starting to emerge, with some strong quality improvement champions.
- Trust between all levels of the organizational hierarchy exists.
- The preoccupation with 'numbers' is less marked than with 'drifters' or 'tool-pushers'.

- The 'hype' which is usually associated with TQM is replaced by an acceptance of good management principles and practice.

In Level 4 organizations, TQM is still, however, dependent on a small number of key individuals to sustain the drive and direction of the improvement strategy. There is a danger of lost momentum and failure to 'hold the gains' if key managers or directors leave, if business mergers or organizational restructuring take place, or if the economic environment and trading conditions become difficult. This has been the case for a number of organizations during times of recession, where the long-term nature of TQM and its benefits have been discarded at the expense of short-term 'survival'.

Level 4 organizations are termed 'The Improvers'. They are moving in the right direction and have made real progress, but still have some way to go. TQM is not internalized throughout the organization and the process of improvement is not self-sustaining, with organizations still vulnerable to short-term pressures and unexpected difficulties. The results of improvement projects are not all effectively utilized for improvements and such initiatives are heavily dependent upon the individuals driving them. It is also likely that the change in culture is relatively slow and some contradictory signals are sent out (e.g. people empowerment versus control mechanisms). An overall strategy which pulls all the islands of improvement together is not fully in place, and concerns will also be expressed by management with respect to resources, in particular time. In 'improvers' the more complex quality management techniques must be implemented carefully. They should be handled by employees who are able to understand them, otherwise people will be overwhelmed and the technique rejected.

The next step forward involves the management and co-ordination of quality improvement across entire streams of processes – the point at which quality improvement starts to become total. Process-stream improvement and benchmarking activities of key processes may take between five and 10 years to mature sufficiently, so it is unlikely that the kind of cross-functional culture required to move up to Level 5 will emerge in less than five years; it is more likely to take around 10 years. At this stage of development, TQM will be a focal point but will not necessarily have attained prime strategic importance.

Level 5 – Award-Winners

To date there have been over 250 winners of the Deming Application Prize, the Japan Quality Award, the MBNQA and the EQA.

In their research on the long-term management issues of continuous improvement, Williams and Bertsch (1989) conclude that strong, world-class, quality-related competitiveness can only be achieved when an organization has reached

the stage of being able to compete for the top quality awards (i.e. Deming Application Prize, Japan Quality Award, MBNQA, and the EQA). Because the challenge is so formidable very few companies have been able to reach this level of quality.

Level 5 organizations are termed 'Award-Winners'. However, not all organizations reaching this level have actually won an internationally recognized or national quality award but they have reached a point in their TQM maturity where the kind of culture, values, trust, capabilities, relationship and employee involvement in their business required to win such an award have been developed; a point at which continuous improvement has become total in nature.

Such organizations have the following characteristics:

- A leadership 'culture' throughout the business that is not dependent on the commitment and drive of a limited number of individuals; all employees are involved in improvement.
- A number of successful organizational changes have been made.
- Business procedures and processes are efficient and responsive to customer needs.
- Effective cross-functional management processes and achieved process-stream improvements that are measurable.
- Strategic benchmarking is practised at all levels, in conjunction with an integrated system of internal and external performance measurement.
- A more participative organizational culture than before TQM was initiated.
- Powers of decision-making relinquished by management to people at lower levels of the organizational hierarchy in varying degrees.
- TQM is viewed sincerely by all employees as a way of managing the business to satisfy and delight customers, both internal and external.
- Perceptions of key stakeholders (i.e. people, customers and society) of organizational performance are surveyed and acted upon to drive improvement action.

However, although they may appear to form part of an elite, Level 5-type organizations have not necessarily achieved 'world-class' status. The attainment of Level 5 status marks the end of an organization's TQM apprenticeship and signifies that the organization has the capability and the potential to make an impact at the highest level, world-wide.

Level 6 – World-Class

This level is characterized by the total integration of continuous improvement and business strategy to delight the customer. Williams and Bertsch claimed in

1989 that fewer than 10 companies world-wide, all Japanese, had reached this stage. Smith (1994), in a chapter of his book entitled 'Becoming World Class', says that 'perhaps 50 organizations worldwide earn the world-class label'. However, in discussing numbers the points made by Williams and Bertsch under the discussion of award-winners should be noted.

An indication of world-class quality performance is that a company can apply for the Japan Quality Medal five years or more after it has received the Deming Application Prize. This, according to JUSE, is 'When it has been determined that an applicant company's implementation of CWQC has improved substantially beyond when it won the Deming Application Prize' (Deming Prize Committee 2000). They go on to say that 'By setting the goal of applying for the Japan Quality Medal when companies receive the Deming Application Prize, they can expect to prevent their CWQC from becoming stale and sluggish. In this way they can further develop their CWQC practices.' The Japan Quality Medal has currently been awarded on just 16 occasions (2000 data). While it is a clear indicator of TQM maturity, this award is not the sole qualification for Level 6 status.

Closer to home, the Royal Society for the Encouragement of Arts, Manufacturers and Commerce points out in *Inquiry: Tomorrow's Company* (RSA 1995) that there are too few world-class companies in the UK and an insufficient number of such companies are being created. In discussing the approach of 'tomorrow's company' the point is made that:

> The companies which will sustain competitive success in the future are those which focus less exclusively on shareholders and on financial measures of success – and instead include all their stakeholder relationships, and a broader range of measurements in the way they think and talk about their purpose and performance.

The characteristics of such a company, which it is claimed can compete at world-class levels, are examined in the inquiry and summarized as:

- Defining and communicating purpose and value
- Developing and applying a unique success model
- Placing a positive value on relationships
- Working in partnership with stakeholders
- Maintaining a strong license to operate

The relatively small number of organizations which have truly reached Level 6 epitomize the TQM concept. TQM is concerned with the search for opportunities to improve the ability of the organization to satisfy the customer. By this stage of TQM maturity (which will have probably taken more than 10 years after its initiation), the organization is continuously searching to identify more product and/or service factors or characteristics which will increase customer

satisfaction. The focus of its TQM strategy is on enhancing competitive advantage by improving the customer's perception of the company and the attractiveness of the product and/or service. This constant drive to enhance customer appeal through what the Japanese call 'miryokuteki hinshitsu' ('quality that fascinates') is integral to the concept of continuous improvement. Just like the concept of total quality itself miryokuteki hinshitsu is a vision, a paradigm and a value framework which will condition an entire organizational culture.

The never-ending pursuit of complete customer satisfaction to satisfy latent requirements is a personal goal of everyone in the organization and an integral part of their everyday working lives. TQM is no longer dependent on top-down drives to improve motivation and deploy the policy, but it is driven laterally throughout the organization. Kanter's terminology (1989) of 'PAL' – pooling, allying and linking across organizations – is useful here; she describes organizations who *pool* resources with others, *ally* to exploit opportunities and *link* systems in partnerships. Those organizations that PAL while seeking continuous improvement of processes and customer satisfaction are typical of Level 6.

Customer desires and business goals, growth and strategies are inseparable; total quality is the integrative and self-evident organizational truth. The vision of the entire organization is aligned to the voice of the customer in such organizations. Total quality is the single constant in a dynamic business environment – it is a way of life, a way of doing business – for all 'world-class' organizations. In summary the characteristics of world-class organizations are:

- Company values are fully understood and shared by employees, customers and suppliers.
- Each person in the organization is committed in an almost natural manner to seek opportunities for improvement to the mutual benefit of everyone and the business.
- Dependability is emphasized throughout the organization.
- The right things are got right first time and every time in every part of the company.
- Waste is not tolerated.
- The key processes of the organization are aligned to create common and shared objectives and to facilitate an environment conducive to improvement.
- There is total willingness and inherent capability to predict and respond to changing market conditions and customer needs and requirements.
- They constantly compete and win against the best world-wide.

Attaining Level 6 status is not the end, for none of the levels described here represents a 'steady state'. In particular, 'world-class' status is often attainable for only a few years, and it is dangerous for an organization to become complacent and blinkered to environmental changes. It is possible for such organizations to 'slip' to Level 5, or even lower.

Summary

Total quality management is a strategy for change in an environment where the accepted paradigms are subject to constant challenge. It is a strategy concerned with developing an organizational culture in which people are able to meet these challenges and realize the opportunities of change. The six levels described in this chapter are intended as a positioning model to aid organizations in identifying their weaknesses and addressing them, as part of the continual challenge of continuous improvement throughout the organization. The characteristics underpinning the six levels are also helpful in highlighting different perceptions of progress with continuous improvement at different levels of the organizational hierarchy of a firm. The characteristics of the more advanced adoptions should also provide the requisite inspiration to those less advanced to highlight the type of issues to which attention needs to be given.

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IMPLEMENTING TOTAL QUALITY MANAGEMENT

All glory comes from daring to begin. —**Anonymous**

MAJOR TOPICS

- Rationale for Change
- Requirements for Implementation
- Role of Top Management: Leadership
- Role of Middle Management
- Viewpoints of Those Involved
- Implementation Variation Among Organizations
- Implementation Approaches to Be Avoided
- An Implementation Approach That Works
- Getting On with It
- What to Do in the Absence of Commitment from the Top
- Implementation Strategies: ISO 9000 and Baldrige

This chapter is intended to serve three purposes:

1. To summarize in one chapter some of the salient points concerning the key elements and philosophy of total quality.
2. To develop a logical "road map," or structure for implementation, in order for the student of total quality to better understand the scope and magnitude of total quality implementation.
3. To provide a practical, hands-on, how-to guide for implementing total quality in any organization, in the sincere hope that this text will have inspired some who are in positions of leadership to take this next step.

Total quality management has been accurately described as a journey, not a destination. It is the fervent hope of the authors that many who study the material presented in this text will embark on that journey. This chapter is offered as your guide.

Six decades ago Japan was in a state of crisis. Japan's industry had been decimated by World War II, and its economy was in shambles. It was struggling to rebuild its economy and put people to work. This involved more than just getting the factories running again. Even if they could manage to get production flowing, who would buy the goods that were produced? The vast majority of Japanese people had all they could do to put clothes on their backs and food in their bellies. Japan had to look beyond its own shores for markets. The most obvious market was the United States, the economy of which had burgeoned during the war. However, the U.S. market posed two problems for the Japanese, which were as follows: convincing Americans that they should buy goods from the nation that attacked Pearl Harbor, and overcoming the American association of Japanese goods with inferior quality. Before World War II, Japan had been notably unsuccessful in American markets because of the perception of poor quality in its goods.

Enter Dr. W. Edwards Deming, an American statistician who had been in Japan in 1947 at the request of the Supreme Commander of Allied Powers to help prepare for a census to be taken in 1951. He had met some of the Japanese people who formed the Union of Japanese Scientists and Engineers (JUSE). As JUSE wrestled with the problems confronting Japanese industry and the economy, they were introduced to the 1931 McGraw-Hill book *The Economic Control of Manufactured Product* by Dr. Walter Shewhart of Bell Laboratories, the originator of the control chart. From their acquaintance with Deming, they thought he might help them apply Shewhart's techniques. JUSE wrote Deming in March 1950, asking him to give a series of lectures to plant managers, engineers, and research workers. Deming gave his first lecture on June 19, 1950. Some 500 people attended. Always unwilling to invest his time on a lost cause, Deming insisted that the top executives of Japanese industry get involved. JUSE arranged for that first high-level meeting on July 5, 1950. The top 21 Japanese company presidents attended. Deming told them that they could compete in the world's markets within 5 years if they followed his teachings. They did it in *4* years.

From Chapter 22 *of Quality Management for Organizational Excellence: Introduction to Total Quality,* 7th Edition. David L. Goetsch, Stanley B. Davis. Copyright © 2013 by Pearson Education, Inc. All rights reserved.

This chapter sets the stage for implementation of total quality in any organization. Had Japan not been in such dire straits after World War II—industry in shambles, people needing jobs, the nation with no money with which to import food—perhaps people there would not have listened to and acted on Deming's recommendations. They were *seeking a route to survival.* Your organization may or may not be in a similar fix. When an organization is truly facing the possibility of going out of business, there is a better chance that its management can be convinced to embrace the principles of total quality. On the other hand, when an organization is doing pretty well, then taking on the work that is involved in becoming a total quality organization is more difficult to sell—unless you are at the top of the organization chart.

Change is always difficult, and changing a culture that has been ingrained for many years is a monumental undertaking. When change is seen as the last hope for survival, it gets easier. People are more receptive to change when they realize that they will surely be out of jobs unless change is made. Is it worth the trouble? Unquestionably. Is survival ensured with change? No. But the other side of the coin is that going out of business is virtually ensured if you don't change. Every enterprise, no matter what the type, will be pressured more and more as total quality pervades industry, education, health care, government, merchandising, and services. Managers should consider whether they would prefer to be ahead of the quality groundswell or engulfed by it—out of control, fighting for survival with the odds against success much higher.

This chapter provides insights to help you implement total quality. No one best way fits the needs of all organizations. What you will find in this chapter are not prescriptions, but suggestions and examples of what has worked, with the idea that you may find the inspiration that will lead you to success in your own organization.

RATIONALE FOR CHANGE

What's wrong with the traditional way we do business?

1. ***We are bound to a short-term focus.*** If the organization of which you are a part is similar to most in the West, it is driven by short-term objectives. This is true whether you are in industry, education, health care, services, or government. For more than 60 years, we have been the victims of Keynesian economics. Everything we do has to have a measurable payback in the next quarter or the next year, or it cannot be justified. Whether Keynes had that in mind or not, it has become a reality of Western management and business. It is the sentiment "Don't tell me how good it will be in 5 years. What are you going to do for me today?"

2. ***The traditional approach tends to be arrogant rather than customer focused.*** Western organizations have tended to be arrogant. They think they know more about what their customers need than their customers do. Or worse yet, they don't care about their customers' needs. To illustrate this point, go into a typical government office and try to get something done—get new license plates for your car or have some legal papers executed. Often you will find that the employees, whose salaries come from your taxes, are rude, inefficient, and totally disinterested in you or your needs. The same thing has happened in industry.

3. ***We seriously underestimate the potential contribution of our employees, particularly those in hands-on functions.*** The person who knows the most about a job—and the one who is most likely to know how to solve problems—is the person who is doing that job and facing the job's problems day in and day out. This truth is proven over and over, yet the typical traditional manager does not believe it. This factor alone is responsible for much of the poor job performance and ill will that exists between management and labor, the folks who have to do the work. People generally want to do a good job; but faced with processes that are not capable and management that will not listen, they soon determine the only way to get ahead, or stay employed, is to "live with it and don't make waves." The result is that the brainpower we employ is largely wasted. Think about it: if you are in a 100-person organization and only two or three people can make changes to the procedures you work by and the processes you work with, 97% or 98% of the idea potential and creativity is silenced—but you still pay for it.

Let us bring home this point. Konosuke Matsushita, the head of Matsushita, the giant Japanese company that produces electronic equipment under the Panasonic brand name, writes:

> We are going to win and the industrial West is going to lose out; there's not much you can do about it because the reasons for failure are within yourselves.
>
> Your firms are built on the Taylor Model. Even worse, so are your heads. With your bosses doing the thinking while the workers wield the screwdrivers, you're convinced deep down that this is the right way to run a business. For you, the essence of management is getting the ideas out of the heads of the bosses and into the hands of labor.
>
> We [in Japan] are beyond the Taylor Model. Business, we know, is now so complex and difficult, the survival of firms so hazardous in an environment increasingly unpredictable, competitive and fraught with danger, that their continued existence depends on the day-to-day mobilization of every ounce of intelligence.[1]

Considering what Matsushita, Sony, Hitachi, and other Japanese consumer electronic firms did to the American

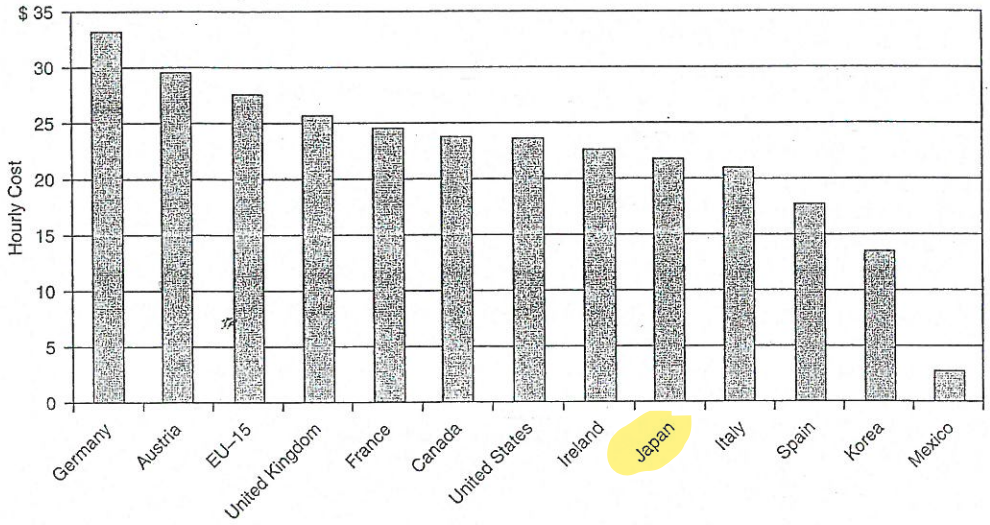

FIGURE 1 Hourly Production Labor Costs in U.S. Dollars, 2005

Source: U.S. Department of Labor, U.S. Bureau of Labor Statistics, December 2007.

Note: EU–15 is the average for Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom.

competition, his remarks, while chilling, seem reasonable. The Japanese certainly won that battle, but the war is not over yet. Many Western organizations have also concluded (if belatedly) that our traditional management system (the Taylor Model) wastes brainpower in unthinkable amounts and is no longer appropriate; they have adopted the total quality model. If yours has not, now is the time.

4. ***The traditional approach equates better quality with higher cost.*** Philip Crosby wrote a book titled *Quality Is Free.*[2] The title was probably intended to catch the potential buyer's interest with its shock value. When the book was published in 1979, not many traditional managers would buy the idea that quality is free. In the ensuing years, however, that title has proven to be *understated.* Organizations that have successfully changed themselves into total quality enterprises have found not only that quality is free but also that it brings unforeseen benefits. Sadly, though, many traditional managers still believe that if you want better quality, you have to pay more for it. But the marketplace has found that if you want better quality, you simply pick the supplier that has demonstrated superior quality at the same price. That is why the Japanese cars have been so successful. Unfortunately, it is also the reason so many of our industries—radios, televisions, VCRs, and stereo equipment, just to name a few—have been lost. Better quality was to be had from other suppliers—for the same cost—and that is where the buyers went.

This issue of better quality from foreign competitors for the same cost is not a matter of lower wage scales in those countries. With few exceptions, wage scales in most of the developed nations do not differ widely. December 2007 data from the U.S. Department of Labor include hourly labor costs in U.S. dollars for production workers in several countries for the year 2005, the last year for which data are available (Figure 1). You will note that France, Canada, the United States, Ireland, Japan, and Italy all have hourly production labor costs between $20 and $25, with the United States and Japan separated by $1.89. For most of the past 15 years, Japan's hourly production labor costs have been higher than those of the United States. Figure 1 also shows that if any geographic entity was being adversely affected by high labor costs in 2005, it was Europe. Eight European countries and Australia and Canada (not all shown on Figure 1) had higher hourly labor costs than did the United States. Of course, there are a number of countries, including Korea, Taiwan, and Mexico, whose hourly production labor costs are significantly less than ours. But the point we want to make here is that whether in the United States or Japan, the cost of producing comparable quality products should be about the same. The same product would likely cost a little more if produced in Europe and a little less if produced in Korea, and that is borne out by product pricing with which we are all familiar. It is important to keep in mind that for manufactured goods like automobiles, televisions, washing machines, and so on, labor costs represent only 10 to 15% of the product's cost to the manufacturer and can be significantly less than that in factories with automation. That means that it takes a large difference in labor cost to yield a meaningful change in the ultimate cost of the product. The fact is that, when Japan is able to produce a $20,000 car that is of superior quality compared to an equivalent domestic offering, it is simply because that company has embraced total quality methods and honed them for 40 to 50 years.

5. ***The traditional approach is short on leadership and long on "bossmanship."*** Far too many Western managers see their jobs as simply telling subordinates what to do and when to do it. It is their station in life to make sure that the procedures are followed, that quotas are met, and that no one makes waves. It is easy to be critical of this kind of "leadership," but for 95 years, it is what we have been taught. It is a product of mass production, springing out of Henry Ford's Highland Park assembly line in 1913 and being adopted in one form or another by just about every kind of production activity. What exactly did Ford do? Prior to 1908, all automobiles were manufactured in craft shops. In North America, Europe, wherever, craft production was how things were made. All the people engaged in the making of an automobile were skilled craftsmen. All parts had to be hand-fitted by filing, cutting, or shaping. No two of anything coming out of a craft shop were the same. Ford realized that if he could make parts interchangeable, thereby eliminating the filing and bending, he could produce his cars a lot cheaper—and achieve unit-to-unit consistency in the bargain.

For example, in 1908 a Ford assembler/fitter (notice the latter designation) spent 514 minutes to complete his task before repeating the same steps on the next car. His work included getting the parts, filing or shaping them to fit, and bolting them on and adjusting and aligning as necessary. It also included maintaining his tools. These were multiple tasks—tasks requiring a craftsman's skills. At about that time, Ford finally achieved perfect part interchangeability. Ford assemblers then went to a single task, with the cycle time dropping to 2.3 minutes—the assembler's assigned task took only 2.3 minutes to complete before the assembler was ready to repeat it again on the next car. Productivity went up in a dramatic fashion. Having to do only one simple task over and over meant that the assembler (he was no longer a fitter) got to be an expert at it very quickly. Ford took it to the next step in 1913 with his introduction of the moving assembly line. Now the assembler no longer had to move. The work came to him. Assembler cycle time dropped to 1.19 minutes.

We cannot give Ford all the credit for part interchangeability because Cadillac apparently beat him to that goal by 2 years, achieving it in 1906. But Ford must be credited with the moving assembly line and what has been called the *interchangeable worker*.[3] Ford no longer needed skilled craftsmen. He could hire unskilled assemblers direct from the farm or immigrants who couldn't speak or read English. Within just a few minutes, they would be as expert as the assembly line demanded. This division of labor down to its simplest terms paid big dividends for Ford and for society in general. For the first time, the possibility of owning an automobile was not restricted to the wealthy. When the Model T was introduced in 1908 with its interchangeable parts, it cost far less than competing cars. In the early 1920s, Ford's interchangeable workers produced 2 million identical cars each year, and the cost was reduced by another two-thirds. Ford's production techniques soon found their way into virtually all manufacturing activities in North America and Europe.

Mass production had arrived—and with it the elimination of skills. Soon industry found ways to divide labor in other areas to minimize the need for worker skills and knowledge. We called it *specialization*. In this kind of environment, all you needed were simple work instructions, the right tool, and the requisite muscle to turn it. Follow the instructions—over and over and over again. Don't improvise; don't make waves; just follow orders. Supervisors and managers have been trained in this system for nearly a century. It worked, at least for a while. For the last half of that period the Japanese have demonstrated a better approach.

REQUIREMENTS FOR IMPLEMENTATION

Some parts of your organization are concerned that the future holds little promise of prosperity unless fundamental changes are brought about. Perhaps your competition is taking market share. You know that your product quality is not good enough. There is strife within your firm, bickering among departments, endless "brushfires." The total quality approach is working for others. Maybe total quality is what is needed. What has to happen for total quality to take place? What are the requirements for its implementation?

Commitment by Top Management

First and foremost, for total quality to become *the way we do business*, an unwavering and unquestioned commitment is required at the top. The CEO, general manager, or whatever title the top person has must commit not only resources but also a considerable amount of his or her own time. Top executives should plan on a third to half their time being used in the total quality effort. Certainly, less than a quarter of their time is not sufficient. Some say, "But the president is so busy. Why can't he delegate the implementation?" Neither in personal experience nor in the recorded experiences of the many companies of which we are aware is there a single success story of a delegated total quality implementation. People expect the boss to put his or her efforts on the most important issues. If they fail to see that effort as being total quality, the subliminal message is that total quality is not number one. Some departments will press on—for a while—until they get at cross purposes with other departments that are marching to the beat of a different drummer. Who has the authority to solve the impasse? Only the boss, and he or she is not involved in the process.

For an organization to completely embrace total quality from the mailroom to the executive office, a profound change is required in the corporate culture. Changing a culture is very difficult even when everyone is willing, and it is almost never the case that everyone will be willing. Some see danger in change, danger to their personal position, the threat of loss of power or prestige, perhaps even loss of employment. Some just like everything the way it is and see no reason to change. Some will be unwilling to put in the work required. Some

cannot believe that total quality makes sense. If the message from the top is not crystal clear and if the person at the top is not seen as being totally involved, that will be all the encouragement some will need to "toss wrenches into the gears."

But there is another reason the person at the top must be involved: the change to total quality is a learning experience. If the boss is not involved in it day to day, he or she will never know enough about what is happening to make rational decisions affecting the change. For example, suppose department heads have been meeting over the course of a month or two, wrestling with the issue of how the organizational structure needs to change to accommodate total quality. These people have aired the problem, have developed suggestions for change, and generally understand the issue. However, a change as far-reaching as creating a new organizational structure is beyond the scope of the department heads. Only the person at the top can do that. How do the department heads get that person to understand everything that has happened in these meetings? They have been at it for weeks. A 1-hour briefing is not going to get the boss up to speed. In this setting, the naysayer's impassioned plea for the status quo takes on a credibility that would have been impossible if the boss had been involved in the meetings from the start. The boss hears from one side that the proposed change must be put in place if total quality is ever going to provide the promised benefit. From the other side, he or she hears that the proposed change would be disruptive at best, and possibly disastrous. The span of control will be too wide, allowing things to drop through the cracks. Perhaps the system currently in place is not perfect, but at least it is familiar—and it works. What would you do? If you were the boss and heard these arguments, would you risk the company and make the change? The easy thing to do is do nothing: tell the department heads that you understand where they are coming from and that maybe sometime later it will be an appropriate thing to do, but in the meantime, they'll have to figure ways to work around the structure.

QUALITY TIP ▽

It Isn't Easy, but It's Worth Doing

In a review of an earlier edition of this text on the Amazon.com Web site, the reviewer chastised the authors for making TQM sound like it was difficult to achieve. We are quite sure the writer of the review had never been through a TQM implementation because if he had, he would more likely have agreed that it is not easy. The task is sometimes more than an organization is prepared to take on or to complete. Even so, it is shortsighted not to try, for it is certainly possible to accomplish with support from the top and a well-planned approach. The easy part will come after total quality is in place and performance and quality are improving, while simultaneously costs and time required are declining. Take our word for it—few TQM implementations take place without a lot of hard work and determination, none without a supporting commitment from the top. Yes, it is difficult, but the reward makes the endeavor sweet.

Source: David L. Goetsch and Stanley B. Davis.

What happened in this example goes on all the time. The boss is given a briefing from which he or she is expected to know as much as the briefer. It cannot be. The briefer has been directly involved in weeks of discussion and has the benefit of long and thoughtful consideration and deliberation. The boss got a few minutes of encapsulated data and has had no opportunity to consider them. Should he or she decide against the change, the decision will make an immediate and lasting impact on the proponents. They won't make that mistake again. Wasted weeks of effort, and for what? Only to be told that the boss thought the organization had better stay the way it is and make the best of it. Total quality will probably come to a screeching halt then and there. Does this happen in the real world? Yes, it does!

2 Commitment of Resources

The other part of the commitment is resources. Total quality implementation need not be expensive, but everything has a cost. In this case, the cost will certainly include some training. It may also include some consultant expense. The dollars must be there when they are needed. The difficulty is that it will not be easy to project a payback; so many factors can affect a company's performance that it may be impossible to know with certainty that *X* dollars invested in training yielded *Y* dollars in performance gains. This area conforms to Deming's truth that some things are not measurable. Accountants don't like to hear that.

The test for commitment of money should be one of reasonableness. Does it make sense to do this? Is the timing right? Is the money available? Can we afford it? Is it the right thing to do? If the answer to these questions is yes, you should not worry unduly about trying to capture the payback. Chances are good that it would cost more to figure out what the payback should be than the project itself will cost, and you can never be certain of the data.

3 Organization-wide Steering Committee

The third thing needed for company-wide implementation is a top-level steering committee. It may be called by a number of names, but it should be chaired by the person filling the top position in the organization's structure, and its membership should comprise that person's direct subordinates. In a typical corporate setting, this would be the president as chair, with all of the vice presidents filling the membership. The function of this group is to establish how total quality is to be implemented and then to see that it happens. As the conversion process starts, it will be necessary to set up cross-functional teams, to establish the teams' objectives, and to monitor results. Ultimately, this group will find itself operating as a team rather than just as the staff. It will set the vision and goals for the organization, establish teams to pursue the goals, monitor the teams' progress, and reward them for their achievements. The important point, from the outset, is that implementation requires management. Otherwise, it can easily set off in too many directions at once, some of

which may not even be in concert with the company's objectives. This cannot be allowed to happen. The energy that is going to be unleashed throughout the organization must be channeled. The steering committee does that.

Another important aspect of the steering committee is symbolic. If the employees observe the top-management group functioning like a team and doing things differently from the way things used to be done, they will get a strong message that this time something really is happening. If, on the other hand, they see the staff operating just as they always have, they will know that failure is simply a matter of time. Why bother to get involved? Do not minimize the difficulty of doing this. The typical staff is made up of stars, not team players. They have insulated their respective departments with walls that can defy all efforts to penetrate them. Their interests usually lie in their own departments rather than in the long-term vision and objectives of the company. What is worse, they don't have a common language—having backgrounds as diverse as engineering, finance, management information systems, human resources, quality assurance, manufacturing, purchasing, and so on. In many cases, they do not trust each other. Is it any wonder that we have problems? The person with the biggest challenge is the one who has to forge this crowd into a cohesive, mutually supportive team. But it must be done. The upside is that almost invariably, once they really start to function as a team, staff members will never want to go back to the old ways again.

Planning and Publicizing

So far, we have secured commitment from the top and established the steering committee. At this point, the real work has only begun. We've just said we're going to do it and determined who is going to manage it. Now we have to get down to the details. The steering committee must develop the vision statement and guiding principles, set the goals and objectives, put the TQ implementation plan in place, and then develop an award and recognition program and other publicity efforts. All these matters will be discussed next.

Vision Statement and Guiding Principles Where would the organization like to be 5 or even 10 years down the road, and what are the guiding principles for operating the business? The vision statement is a long-range strategic view. Total quality needs a long-range vision because total quality is achieved only over a relatively long period, although there will be visible improvements practically from the outset. We are really talking about fundamental changes in the way we do things and how people work together; about involving customers and suppliers in ways never before considered and putting values on matters that may never have been discussed. Not everything will come together overnight, so the vision must be of a distant target to provide a consistent course into the future. Without that, the company will find itself taking turns and detours with every new quarter or year. That will destroy the effort. Consistency is the watchword.

Toyota Motor Sales USA Inc.:
To be the most successful and respected car company in America.
Rollins College:
To be one of the nation's leading colleges, emphasizing academic excellence, responsible citizenship, personal growth, and ethical leadership.
Park Place Lexus:
To be the unparalleled retail automotive group in the United States.

FIGURE 2 Sample Vision Statements from a Manufacturer, a College, and a Car Dealership

Sources: Toyota, www.toyotamotors2alesus.com, retrieved September 23, 2011; Rollins College, www.rollins.edu, retrieved September 23, 2011; Park Place Lexus, www.quality.hist.gov/PDF_Files/Park_Place_Lexus_Profile.pdf, retrieved September 23, 2011.

The vision statement need not be lengthy—in fact, the shorter, the better. But it must represent the best collective thoughts of free and open discussion by the steering committee. If your organization is part of a larger entity (such as a division within a company) that has a vision, then you need only tailor yours to support that one. The total quality vision statement will usually include a recognition that only the customers make the final judgment of success or failure. If not stated in words, that idea must be implicit. Sample vision statements from a variety of businesses are found in Figure 2.

The guiding principles are the second element of the vision and usually accompany the vision statement in a single document. The guiding principles establish the rules of conduct for the organization and its members. These principles may be concerned with honesty, ethics, respect, fairness, quality, suppliers, customers, community, environment, roles of management and employees, and so on. This can sound very lofty indeed, and that is not a bad thing. People want to be associated with organizations with lofty ideals. They want to be proud not only of their own contribution but also of the company. Sample guiding principles are listed in Figure 3.

A well-written vision statement with its attending guiding principles has the following properties:

1. Is easily understood by all stakeholders (employees, customers, suppliers, and others)
2. Is briefly stated yet clear and comprehensive in meaning
3. Is challenging yet possible to accomplish, lofty yet tangible
4. Is capable of stirring excitement and unity of purpose among stakeholders
5. Sets the tone for how the organization and its employees conduct their business
6. Is not concerned with numbers

The vision statement must be crafted in such a way that all employees can relate to it and, in so doing, execute their work in a manner and direction that is consistent with its meaning and objectives.

Evonik Industries AG (Formerly Degussa)
Focus on our customers.
Operate according to Responsible Care principles that protect employees, environment and the community.
Respect diversity in culture, gender, nationality and race.
Treat people fairly, with consistency and respect different opinions.
Be open, honest, and share information.
Encourage learning, develop people, foster teamwork.
Set clear goals, empower employees and encourage open feedback.
Take responsibility, and lead by example.
Support innovation and initiative, learn from mistakes, strive for excellence.
Act with passion for our business.

PepsiCo Inc.
Care for customers, consumers and the world we live in.
Sell only products we can be proud of.
Speak with truth and candor.
Balance short term and long term.
Win with diversity and inclusion.
Respect others and succeed together.

FIGURE 3 Sample Guiding Principles

Sources: Evonik Industries, www.degussa-usa.com/north_america/en/company/visionmissionguidingprinciples, retrieved September 1, 2008; PepsiCo Inc., www.pepsico.com/PEP_Citizenship/pepsicovalues/index.cfm, retrieved September 1, 2008.

Goals and Objectives The broad strategic goals and objectives established by the steering committee must harmonize with the vision statement. These goals and objectives are for the total organization rather than necessarily aimed at the individual operating departments. They flow from the vision statement and are frequently part of the organization's strategic plan. To achieve the vision, these are the objectives that must be achieved. From these goals and objectives, supporting specific tactical objectives will be developed for departments, teams, and even individuals. The vision points the company in the desired direction and girds employees with the principles they must use in pursuit of the vision. The broad goals and objectives represent the strategic targets along the way to achieving the vision. Finally, a lower tier of specific tactical objectives describes what must be done as the company goes about achieving broad objectives and the vision. At both levels, objectives should be stated relative to total quality implementation. A word of caution: don't try to include every possibility and contingency. A few well-crafted goals are what you want. It may be that not all of your goals are measurable, but all should be defined such that you at least know when a goal has been achieved. See Figure 4 for the hierarchy and Figure 5 for sample objectives.

Total Quality Implementation Plan The plan is driven by the vision, goals, and objectives. It spells out as precisely as possible the route the implementation will take. No two total quality implementations will be the same. Your own organization—after considering your vision and objectives, studying the material, perhaps consulting with

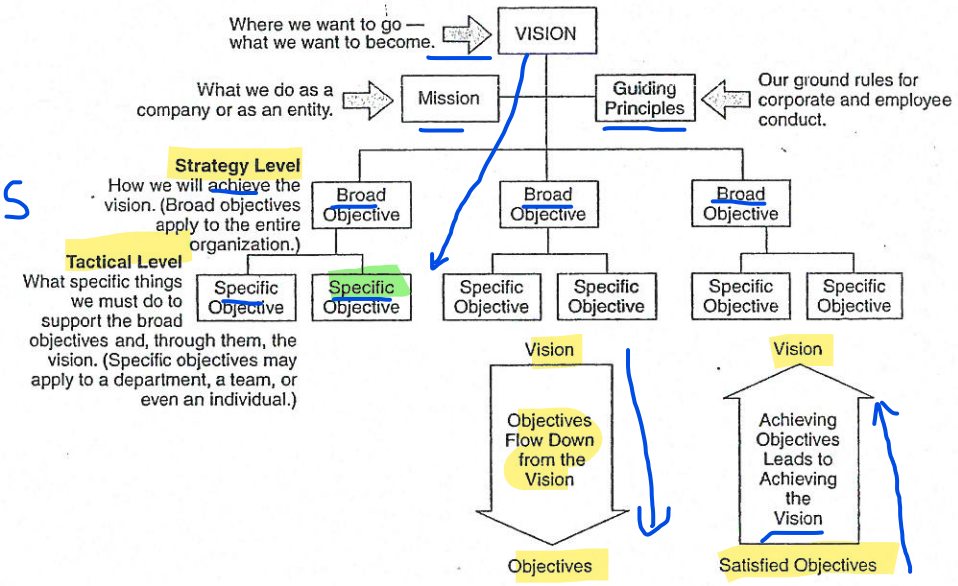

FIGURE 4 Hierarchy of Vision and Objectives