

General Electric reported costs savings of nearly USD 2 billion for 1999, thanks to its Six Sigma improvement programme. The Annual Report for 1999 from General Electric Capital Services states: "Wherever we are in the world, GE Capital is applying Six Sigma ... it delivered over USD 400 million in net income in 1999". AlliedSignals (now Honeywell) reported similar cost savings, totally more than USD half a billion in 1999. They have accomplished almost incredible savings by focusing heavily on quality, or, more specifically, by reducing the number of defects to a level that is unbelievably low. Following these and other successes, the Six Sigma programme has been spread across the world.

During the last few years Lean or Lean Production, with its origin from Toyota, has been in emphasis with its focus on creating customer value and eliminate waste.

These and other improvement programmes, which often can be considered as parts of what in this book is called Total Quality Management are in many ways beneficial. However, one risk is that through a jumping between different programmes the totality that Total Quality Management represents get lost.

Today, it is extremely important for companies and organizations to continuously work with quality improvements, and the demand for quick changes has probably never been greater. The competition is global, and we are moving towards a world with fewer and fewer boundaries. To small companies, for example sub-contractors of large, often international groups, the competition will certainly harden.

Following the globalization we are witnessing today, with mergers and other forms of co-operation resulting in Asea-

Brown Boveri, Ford-Volvo (recently changed to Geely-Volvo), GM-Saab (recently changed to Spyker-Saab) and Astra-Zeneca, for example, the demands for change and improvement will be gradually stronger. Concurrently, the information technology is progressing fast, which creates many new opportunities. Information flows, Internet contacts and e-commerce are expanding at an ever-faster pace, and new types of companies that utilize these opportunities emerge. New demands and methodologies are created, through new alliances and networks between companies, whose inter-operations benefit from information technology.

The values, methodologies and tools from Total Quality Management, which originally were developed for the private sector, are now also gaining ground in public administration and state-owned companies. Illustrations of this are that in Sweden the Lung Medical Clinic of the University of Linköping, the Mail Service Department of the Swedish Post, and Älta School outside Stockholm, have received the Swedish Quality Award, in recent years. Also the Malcolm Baldrige National Quality Award in the US and the EFQM Excellence Award in Europe have been received by schools at different levels and by hospitals. In fact, there are even local communities, which have used values, methodologies and tools from Total Quality Management as a base to change the trend of migration to a sustainable social and economic development.

If a nation is to maintain, or preferably advance, its position on the world market, companies and organizations have to work more generally and systematically to adapt a Total Quality Management approach that will achieve continuous quality improvements.

# 1 Quality and quality improvements

Quality has always been an important issue to the customer when buying different products, i.e. goods, or services, or a combination. Companies with an innovative and systematic way of working with quality and quality improvements have often achieved great success on the market, lower internal costs and a shorter design and development phase of new products.

One illustrative example of this is what sometimes is called the "Japanese wonder"; the rebuilding of Japanese industry after the Second World War. During this period Japanese senior managers gave quality issues a very strong focus and a strategic role. They realized early that the quality concept should emanate from the needs and expectations of the customers. They also realized that the costs of quality defects, related to changes, scrapings, revisions and delays were significant, as was the cost of keeping large buffer stocks. By systematically focusing on customer needs and expectations and systematically working with quality improvements and waste reduction Japanese companies succeeded in dominating the international market in several areas beginning in the 1970s and 1980s. One example is the video equipment market, which was almost completely monopolized by Japanese manufacturers. Another example is the car industry, in which General Motors, Chrysler and Ford, sometimes called "the big three", were almost obliterated from the car market. Toyota, with its very strong focus on quality both externally to the customers and internally in the relations to the staff, is one of the most successful companies in the world<sup>1</sup>.

Another reason for the success of many Japanese companies was that they successfully deployed simple statistical tools to identify and elimi-

<sup>1</sup> Toyota has today about 10% of the world market and is today the world's largest car manufacturer. Toyota had in its "Global Vision 2010" to reach 15% of the market. The market share in the US is already larger than that and in China the share is larger than 10%. However, when writing this in the spring 2010, Toyota has also had major quality problems and had to recall millions of cars (see also Section 3.5).

nate sources of variation, and in that way reduced poor-quality costs drastically.

As a consequence of the Japanese companies' great success on the world market, quality issues were emphasized during the 1980s, at least in those industries with the largest competition.

Today, the successful use of the improvement programme Six Sigma<sup>2</sup> in several companies, such as, for instance, General Electric, Bombardier, Whirlpool, Sony, and SKF, has once again woken up company top managers over the world. They have been reminded that successful, long-term based work with quality improvements can create major savings by eliminating poor-quality costs.

However, it is not easy to establish the deep and thorough cultural changes, which are needed to achieve success. Many companies have started their improvement work with top managers, who have not completely understood the quality concept or what modern quality management really means. Many companies and organizations, both in the private and public sector, say that they have "implemented" some "quality method", sometimes under names as Total Quality Management, Lean Production, or Six Sigma, without really having changed that much. In many cases the companies have had large weaknesses in leadership, knowledge, system thinking, culture, and long-term thinking. It is therefore not surprising that they have not succeeded in their efforts. In several cases, the top managers have then blamed the approach and looked for a new "quality method", which may solve their problems better. Another contributing reason here is also the shareholder interest in short-term financial results. This type of "quarterly management" is certainly one reason why many organizations have problems with quality issues today. This development has also contributed to the fact that the concepts of "quality" and "Total Quality Management", which are in focus of this book, have lost their charm in some people's eyes and sometimes have been replaced with other terms.

An effect of the interest in quality and quality improvements during the last few decades is that the word "quality" has become a frequently used – and misused – word. The meaning of this word, and how this meaning has changed over time, will be discussed in this chapter. We will also discuss our view of the principles for what often is called Total Quality Management, TQM.

# 1.1 Quality

## 1.1.1 Some definitions

### Some common definitions

The word "quality" is derived from the Latin "qualitas", meaning "of what". Its use goes back to antiquity. Cicero, the Roman orator and politician (106–43 B.C.), is thought to be the one who first used the word; see Bergman (1974).<sup>3</sup>

The word quality is still sometimes used in the sense of grade or property. One example of this is steel quality, which refers to different types of steel with various strength properties. However, the word has acquired a significantly different and broader meaning over the last few decades.



Figure 1.1 The Japanese signs for the concept of quality. The first sign is pronounced 'hin' and roughly means "product". The second sign is pronounced 'shitsu' and roughly means "quality". Originally this second sign illustrated two axes on top of a mussel and could be interpreted as "a promise of money or the value of money". Nowadays, the combination of the signs denotes the concept of "quality" and not only "product quality".

There are numerous definitions of the quality concept. Some of these are illustrated in Figure 1.2. A definition that is often too narrow is "conformance to requirements" (see Crosby, 1979). This definition has a producer perspective and draws attention to factors such as fulfilling the set tolerances and requirements.

A more customer-oriented definition, "fitness for use", has been credited to the American Joseph Juran (Juran, 1951). Edwards Deming<sup>4</sup> even went a step further towards focusing on customer when he emphasized that "quality should be aimed at the needs of the customer, present and

<sup>3</sup> Cicero is said to have formed the word "qualitas" by adding the substantivized morpheme "-tas" to create "nature" or "character".

<sup>4</sup> Deming's and Juran's view of quality are discussed more in-depth in Chapter 3.

*future*" (Deming, 1986, p. 5). In his definition Deming also pointed to the importance of already considering today your customers of tomorrow. As early as 1931, Walter Shewhart discussed quality issues in his book "Economic control of quality of manufactured product". He argued that there are two sides to the quality concept – one measurable side, as he saw it, and one more subjective side, dealing with how customers experience the product. Both these sides are important to study. The one which is more objectively measurable, is important from a producer perspective, since it is vital to have a common base for the decisions that have to be made during the design and manufacture of the product. At the same time it is the customer who in the end evaluates the product from her or his own subjective point of view. It is the customer's experiences of the product, the article or the service, which is decisive to its success<sup>5</sup>.

The Japanese engineer Genichi Taguchi (see Taguchi & Wu, 1979) defines quality, or rather non-quality, as "*the losses a product imparts to the society from the time the product is shipped*". Even if Taguchi uses his definition for goods, the interpretation might just as well be used for quality of services. Taguchi's definition clearly highlights the connection to the consequences of our products, even to those not primarily using them. Thus it becomes closely related to thoughts on sustainable development and a sustainable society<sup>6</sup>.

The international standard for quality management systems<sup>7</sup> ISO 9000 defines quality as "*the degree to which a set of inherent characteristics fulfills the requirements, i.e. needs or expectations that are stated, generally implied or obligatory*".

We could sum up by saying that for some time, the prevailing position, albeit expressed in different terms, has been that "the quality of a product is its ability to satisfy the needs and expectations of the customers". *Product* here is hardware, software or a service, or a combination of the three.

### A wider view of the quality concept

#### Some definitions of the concept of quality

"The lack of quality is the losses a product imparts to the society from the time the product is shipped"  
Genichi Taguchi

"Conformance to requirements"  
Philip Crosby  
ISO 9000:2005

"Quality is a state in which value entitlement is realized for the customer and provider in every aspect of the business relationship"  
Mikel Harry Six Sigma Academy

"Quality should be aimed at the needs of the customer, present and future"  
Edwards Deming

"Fitness for use"  
Joseph Juran

"... there are two common aspects of quality. One of these has to do with the consideration of the quality of a thing as an objective reality independent of the existence of man. The other has to do with what we think, feel or sense as a result of the objective reality. In other words, there is a subjective side of quality."  
Walter Shewhart

We feel that the definition of quality should be expanded further compared to those presented above and suggest the following definition: "*the quality of a product is its ability to satisfy, and preferably exceed, the needs and expectations of the customers*".

### Quality

The quality of a product is its ability to satisfy, or preferably exceed, the needs and expectations of the customers.

Figure 1.3 Our definition of the "quality" concept for products.

Figure 1.2 Some definitions of the quality concept.

<sup>5</sup> This view of the quality concept is in fact similar to the one by Joseph Juran. He argues (see Juran, 1989) that the product should be free from faults and that the product should fulfill the needs and expectations of the customers.

<sup>6</sup> These concepts are touched upon in Chapter 24.

<sup>7</sup> ISO 9000 is addressed in Chapter 20.

will also speak in positive terms about their experiences and in that way also attract new customers.<sup>8</sup>

Some organizations have created their own interpretations of the quality concept, often with a clearly customer-oriented focus. One of these is "Everything we do must be done in a way that pleases the customers, so that they want to come back to us" (Gunnar Wivardsson, Stena Line); another is "Quality is when the customers come back — not the product" (CEO in a small Swedish company); a third is "Quality is the presence of value defined by customers" (Federal Express).

These definitions make it very clear that as customers we do not only judge the individual product, but we also make an overall judgement of our experiences of the organization that sells or makes the product. When buying a car, for example, we do not only consider the characteristics and performance of the car, but also weigh in aspects such as availability of spares, possibility of service and how we are treated when communicating with the company. The product quality is then only part of our total quality experience. According to this way of thinking, quality is seen more as a relation between a product with its underlying organization and the customer, than as a pure product characteristic. A consequence of this widened outlook is the great interest associated with brands and their impact<sup>9</sup> today.

Figure 1.4 shows a radical interpretation of the quality concept, clearly highlighting holistic and relational aspects.

Quality is what makes it possible for a customer to have a love affair with your product or service. Telling lies, decreasing the price or adding features can create a temporary infatuation. It takes quality to sustain a love affair.

Love is always fickle. Therefore, it is necessary to remain close to the person whose loyalty you wish to retain. You must be ever on the alert to understand what pleases the customer, for only customers define what constitutes quality. The wooing of the customer is never done.

Figure 1.4 A noteworthy definition of the term quality, introduced by Myron Tribus<sup>10</sup> in the ASQC Statistics Division Newsletter, 1990, No. 3, page 2.

## Garvin's five perspectives of quality

We want to complete the discussion of the quality concept by briefly highlighting the perceptive interpretations given by Garvin (1984, 1988). He identified five approaches to the quality concept, the transcendent, product-based, user-based, manufacturing-based and value-based perspectives; see Figure 1.5.

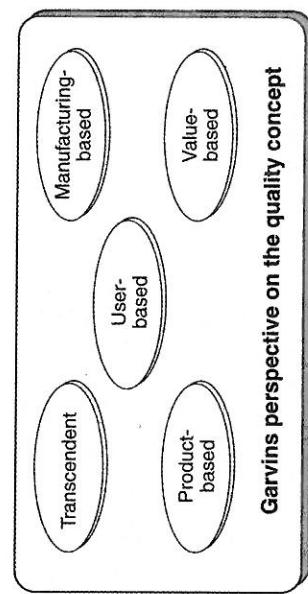


Figure 1.5 The five approaches of the quality concept introduced by Garvin.  
(From Garvin, 1984)

The *transcendent* perspective drives from Plato's view of beauty. Advocates of this view argue that, as quality is identified when experienced, it cannot be defined exactly: "quality lies in the eye of the beholder". The *product-based* view, on the other hand, holds that quality is exactly measurable and is determined by its ability to objectively and precisely measure the extent to which a product possesses certain desirable characteristics. A consequence of this approach is, according to Garvin, that, in most cases higher quality costs more, and that quality is an objective inherent attribute of the product, not something that the buyer or user can judge. Proponents of the *user-based* approach are of the opinion that quality is judged by the customer. It deals with the degree to which the product fulfills the needs and expectations of the customer. The *manufacturing-based* approach relates to the fulfilment of tolerances and requirements in production. Quality here is mainly concerned with technology, and improved quality means less scrapping. According to the *value-based* outlook, quality is defined in relation to cost and price. A high quality product possesses the desired attributes at an acceptable price, or performance at an acceptable cost. Garvin's own conclusion of his discussion is that an or-

<sup>8</sup> Customer satisfaction and loyalty will be addressed further in Chapter 14.

<sup>9</sup> This is sometimes referred to as "Brand Relationship Management".

<sup>10</sup> Myron Tribus (born in 1921) has served as a professor at the University of California, LA; worked at the Centre for Advanced Engineering Studies at MIT, for the American Department of Trade, and at Xerox in Rochester.

ganization cannot have just one approach to the quality concept, but that different approaches are needed in different parts of the organization.

We find that of the definitions in Figure 1.2, Crosby's is manufacturing-based, while Deming's, Juran's and our own definition (Figure 1.3) have a user-based perspective. Our definition is also inspired by theories on service quality, addressing the gap between expectation and experience<sup>11</sup>. Shewhart's view of quality (see Figure 1.2 and Shewhart, 1931) includes an interpretation that may be perceived as a combination of a manufacturing-based (objective measurement) definition and a user-based (subjective assessment) definition<sup>12</sup>. Here we should add that Juran often clarifies his definition of "fitness for use" by emphasizing that the quality notion consists of two separate elements, of which the first is that the product should be free from defects, and the second that it should possess properties that will fulfil customer needs.

### Needs and expectations

Here it is also vital to remember that needs and expectations are two different things. Our expectations sometimes include elements that we do not really need. On the other hand, as customers, we have needs that we do not expect to get fulfilled, often because we do not realize our own needs. For instance, how should I as a patient at a hospital be able to realize my medical needs or how should I as a student at a university be able to realize my needs of knowledge in my future professional life, maybe thirty years on?

Some authors prefer to talk about "requirements, needs and expectations", but in our opinion the word "requirement" does not need to be emphasized. To us, requirements are integral parts of the "needs and expectations" concept.

In our definition of quality we have used the concept *customer needs*. In our discussion we implicitly assume that the customer is making rational decisions based on well-considered facts about her or his own preferences and needs. This might be a correct picture sometimes, but some objections could be made. Without going deeper into a conceptual theorizing about "needs" we could simply divide them in two categories: *personal needs*, which only refer to needs irrespectively of social con-

<sup>11</sup> We will discuss the Gap Model in Chapter 14.

<sup>12</sup> See also the Kano model discussed in Section 14.1.1.

text; and *social needs*, which are related to the needs and possessions of those in the social surrounding. Illustrations of the first kind are, for example, the needs to eat and be warm, while the social needs are relative in nature. Since the neighbour has a new car I need to have one too; because "everyone" has a pair of jeans of a certain brand, I need to have that too, for example. As emphasized by Alvesson (2006), this creates a kind of collective zero-sum game (see also Hirsch 1976). If our needs are defined in terms of the situation of the others and we all want to be ahead we have a "consumption game", which is of zero-sum type, if we "win" some others will "lose". Is this what we really want?

Arguments for the zero-sum view<sup>13</sup> of our collective consumption are given by Alvesson (2006) referring to some American researchers. Some of these arguments are: The share of Americans considering themselves "very happy" was the same 1990 as 1960 even though the living standard during this time had doubled. On the question on which income level they would be happy, those below USD 30 000 answered USD 50 000, while those on an income around USD 100 000 assumed that it would take an income of USD 250 000 to make them happy. Thus some needs seem to be relative rather than absolute and social rather than personal.

Another objection against the objective nature of needs is the massive influence from advertisements giving fuel to the feelings of unsatisfied needs of social nature. As Alvesson (2006) argues, brand names have become an important part of this type of created needs: "...the product has become a kind of transmission platform for the brand. The small Lacoste crocodile needs something to be attached to." If the customers are kings then the emperors, the creator of their social needs, are the real rulers.

### 1.1.2 The customer concept

#### Who is a customer?

From the definition of "quality" it is obvious that the *customer* concept is vital. In this book, the customer concept implies "the people or organizations that are the reason for our activities", i.e. "those for whom we want to create value" by our activities and products.

<sup>13</sup> The term "zero-sum" describes in economic theory a situation in which a participant's gain or loss is balanced by the losses or gains of the other participant(s).

- find out who the customers of the organization<sup>14</sup> are
- find out their needs and expectations
- be sure to fulfil, and preferably exceed, these needs and expectations.

Those we want to create value for are our customers

*Figure 1.6 In this book the customer is seen as someone for whom we want to create value.*

In some contexts the “customer” concept feels unfamiliar and difficult to accept. This difficulty is particularly prominent in parts of the public sector. One reason why the customer concept feels difficult in some contexts is probably that the word is often associated with a financial relation. The person paying for a service may be a totally different person than the one for whom the service is intended to create value. For most goods, and indeed also for many services, such as hairdressing, restaurant meals and car washes, the person paying for the product is normally also enjoying its value. But who is the customer of the education imparted in a school? Is it the pupil, who, hopefully, receives a good education? Is it the local authority paying for school premises and teacher salaries? Is it future employers? Is it the parents? Or is it the community at large? Who, for instance, are the customers of the police and who are the customers of the tax or defence authorities?

Focusing on established customer groups such as pupils, patients or subscribers would be inappropriate. In most cases, the business activities are for the good of many groups of people, which implies several customer categories. Therefore, a general, overall and reasonably neutral word is needed not to prejudice concepts or discussions. When there are several customer categories, the various needs and expectations in the categories do not always coincide. On such occasions it is important to bring any conflicts concerning customer requests to the surface and to make conscious prioritizations. For this reason, every organization should try to answer the question “Who are our customers?” or “For whom are we trying to create value?”. Sometimes the answer is easy; in other situations the effort to arrive at a shared picture of who the customers are may be considerably more complicated.

To sum up, improving quality involves systematic and resource-efficient efforts to

Any one of these items may then be difficult to solve. The object of this book is to provide some ideas for this endeavour.

Finally, we want to mention that Normann (2001) discusses the shifting view on the customer. In the era of mass production the customer was typically seen only as an anonymous part of the market. Today, the personalized customer is in focus and the relation between the provider and the customer are emphasised. For the future, Normann (2001) forecasts that we will see the customer more as a co-producer in a value creating network. In fact, this is already taking place, and this changing view is strongly related to the services dimensions of many products.

### **Customers, stakeholders and interested parties**

Different authors have different definitions of the quality concept. They also have different interpretations of other concepts within the quality area. This is also true for the customer concept.

In the international system of standards named ISO 9000 the customer concept is defined more narrowly than in this book as an “organization or person who receives a product” and the customer concept is exemplified with terms as “consumer, client, retailer, beneficiary and purchaser”.

Those who prefer a more narrow view of the customer concept than the one we use in this book often use other complementary concepts besides customers. In ISO 9000, for example, the concept of “interested party” is used and defined as “person or group having an interest in the performance and success of an organization”. The concept is illustrated by “customers, owners, employees, contractors, suppliers, investors, unions, partners and society”.

Sometimes also the group of interested parties is divided into different sub-groups. Some people also use both the concepts of “stakeholder” and “interested party”<sup>15</sup>. A stakeholder is then often a person or organization

<sup>14</sup> In this book, unless clearly stated otherwise, we alternate between the terms ‘company’ and ‘organization’ to denote/mate a unit producing some form of products, in private or public business.

<sup>15</sup> A fairly lively discussion about these concepts is going on right now. See, for instance, Foley (2005), Bergquist et al. (2007) and Gavare & Johansson (2009).

which supports the organization in some form, but who also has the possibility to withdraw that support if one is dissatisfied with the organization's development. To this group belong, besides customers: suppliers; shareholders; members of the staff; and loan givers<sup>16</sup>. Sometimes this group of stakeholders is divided into *primary stakeholders* and *secondary stakeholders* depending on whether they have the possibility to directly or indirectly influence the withdrawing of support. Owners and loan givers are here primary stakeholders, and the media and environmental organizations can be considered as secondary stakeholders. Interested parties then comprise other people or groups that have an interest in the development, but do not have any influence on the development.

We prefer a much broader view of the customer concept in this book than that used in ISO 9000 and define customers as "those we want to create value for". Customers can be people or organizations inside or outside our own organization. Value is related to the value chains in the organization and not to the financial chains. We also want to see our children and grandchildren as customers. We feel that the word customer has a positive and partly reverent touch, which we like. We will just occasionally use the concepts of stakeholder and interested party in this book. It is worth mentioning here that Juran has a view of the customer concept, which is in line with our view in his definition "anyone who is affected by the product or by the process used to produce the product" (Juran, 1988).

- *reliability*, which is a measure of how often problems occur and how serious these are.
- *performance* of significance to the customers in the intended market segment, such as speed, capacity, useful life or size.
- *maintainability*, which summarizes how easy or hard it is to detect, localize and rectify a problem
- *environmental impact*, a measure of how the product affects the environment, e.g. in the form of emissions or recyclability, and of how environmental aspects are treated in the production.
- *appearance*, an aesthetic parameter created by, for instance, design and choice of colour.
- *flawlessness*, i.e. that the goods are not marred by defects or deficiencies at the time of purchase.
- *safety*, meaning that the article does not cause personal injury or damage to property, or, in some cases, provides adequate protection against damage.
- *durability*, signifying that the product can be used, stored and transported without deteriorating or being damaged.

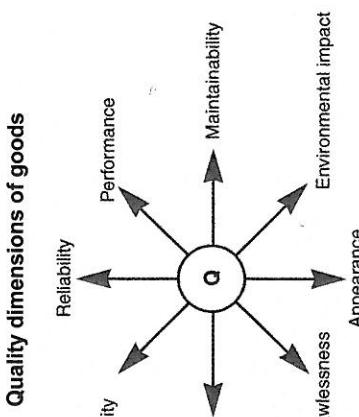


Figure 1.7 Some quality dimensions of goods.

### 1.1.3 Products and their quality dimensions

#### Quality dimensions of goods

The *product quality* concept has many dimensions. For goods, some of them are (see Figure 1.7):

<sup>16</sup> The stakeholder concept is often referred to Freeman (1984). The concept is based on the view that "the primary emphasis of stakeholder theory is the recognition that the firm is a part of a system of interdependencies, or implicit contracts or agreements, and that share-owners are but one small constituency group among a plethora of constituency groups to be served. Since the firm exists to serve stakeholders, financial performance is only a very small slice of a firm's total performance."

## Services and their quality dimensions

In recent years, the general interest in service quality has increased considerably. A growing share of the GDP (Gross Domestic Product), for instance, is in many countries made up of services. Services produced in the public sector include those produced within health care, schools, universities, the police, the judicial system and tax authorities. In the private sector we find transport, restaurants, banks, hotels, hairdressers, video shops, and so on. Service characteristics are becoming different from what they used to be, however, as a growing proportion involves managing information. This new type of services has evolved as a side-effect of the rapid IT growth. Obviously, the design of services that rely heavily on information technology will be strongly affected by future developments. In fact, it is estimated that more than 80% of information technology products are sold to the service sector.

Services are very important in the traditional manufacturing industries as well. Much of what goes on internally in companies can be regarded purely as service production. Also, many services are included with the sold articles. Some examples are sales, warranties, complaint processing, and maintenance. Traditional manufacturing companies are increasingly turning into service producers, a trend that is very likely to grow. The SKF Group<sup>17</sup>, traditionally a bearing production company, now emphasizes its knowledge engineering capability and sells maintenance and condition monitoring services. ABB Robotics, formerly manufacturer of industrial robots, now emphasizes that “a strong focus on solutions helps manufacturers improve productivity, product quality and worker safety”. According to Edvardsson et al. (2000a), no less than 96% of the working hours in ABB Robotics are related to service.

Furthermore, we as customers are moving towards a trend where we purchase functions rather than goods. We do not buy refrigerators but cold storage; and instead of cars, we are buying transportation. Volvo Trucks, who got the Swedish Quality Award in 1998, has changed its core activity from manufacturing trucks to “creating trouble-free transport”. Texas Instruments, receiver of the Malcolm Baldrige National Quality Award in 1992, declares: “we offer solutions, we don’t sell products”. Xerox has changed from a copy machine company to “a document company, which provides solutions to help you manage documents”.

All in all, this means that it is extremely important to focus on handling and improving service quality.

Often highlighted distinctions between goods and services are:

- Services are not as tangible as articles are, and therefore it may be difficult to explain, specify and measure the contents of a service.
- The customer often plays an active role in creating the service.
- The service is often “consumed” while being created, which also means that the service cannot be stored or transported.
- The customer does not become the owner of anything after the service has been delivered.

Services consist of activities and cannot therefore be tested or tried by the customer prior to purchase.

- Services are often made up of a system of sub services, but the customer assesses the entire package, not the separate sub services.

However, the differences between goods and services are diffuse. This applies especially to new types of information services, such as storage (unimportant where) of large amounts of information, which can very quickly be transported to a customer, who then comes into possession of data that can be used instantly, or at some future point of time. Nevertheless, it is of course important to consider the differences connected with the *design* and *execution* of services. These two concepts correspond to design and production, respectively, in the realm of goods.

Although goods and services differ in some aspects, it is crucial to point out that most methodologies and tools for quality improvement are independent of whether the product is purely an article, a service, or a combination of the two.

It is particularly important to establish that in many cases, the quality of a service is essentially determined at the moment when the person performing the service, the service supplier, meets the customer. This is often called *the moment of truth*, and refers to the crucial final meeting between the matador and the bull, when one of them is going to die; see Normann (1984). However, the moment of truth<sup>18</sup> is, unlike the situation for a bull

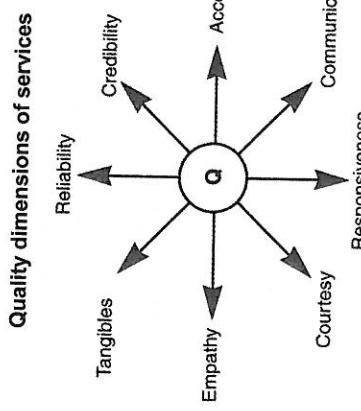
<sup>17</sup> The history of the SKF Group is described in Section 8.1.  
<sup>18</sup> The notion “the moment of truth” gained popularity and international circulation, above all thanks to Jan Carlzon, the former CEO at SAS (see photo in Figure 1.18); see Gummesson (1999).

about to meet his matador, a moment full of possibilities, because of the ample opportunities that the supplier has to convince the customer of the excellence of his service. On the other hand, if a fault has occurred, it is generally too late to do something about it when the customer is gone or has "left the arena". Even the most perfect system of service design and execution is not worth much if it does not work at the very moment of truth. Therefore, service quality should, at least as much as in the case of goods, be regarded as a relationship between, on one hand, the service and its supplier, and, on the other, the customer at the receiving end.

- *responsiveness*, i.e. willingness to help the customer.
- *courtesy*, which refers to the supplier's behaviour, for instance politeness and kindness.
- *empathy*, the ability to understand the customer's situation<sup>19</sup>.
- *tangibles*, the physical environment in which the service is executed, i.e. the appearance of equipment and premises.

To sum up, many of these dimensions are related to the customer's confidence in those providing the service.

In addition to these dimensions, which are for the most part related to how the service is delivered, it is, obviously, also important to look to the actual service content, how this is made up, and if the service meets or exceeds the customers' needs and expectations<sup>20</sup>.



*Figure 1.8 Some quality dimensions of a service. Inspired by SERVQUAL, a set of quality dimensions introduced by Zeithaml et al. (1990). The first version of SERVQUAL consisted of ten dimensions that later was reduced to five. The SERVQUAL dimensions are sometimes also named the RATER-model (Reliability, Access, Tangibles, Empathy, and Responsiveness).*

The quality of a service, like the quality of goods, has several dimensions. Some of these are (see Zeithaml et al., 1990; and Figure 1.8):

- *reliability*, referring to the consistency of performance, including punctuality and precision in terms of information and invoicing procedures, and doing what you have promised to do.
- *credibility*, referring to being able to trust the supplier.
- *access*, i.e. how easy it is to come into contact with the supplier. This is where position, opening hours, website, supplier availability, and other technical facilities belong.
- *communication*, the ability to communicate in an understandable way that is natural to the customer.

A new type of business offering, denoted *commercial experiences*, is currently gaining much attention<sup>21</sup>. Although commercial experiences are not directly in focus in this book, we want to mention this type of product existing on the market, and also state our conviction that much of what will be said in this book is of interest also when considering commercial experiences.

We can think of a visit in Disneyland or a cookery course with a master chef as illustrations of commercial experiences. This type of product differs from traditional goods and services. Pine & Gilmore (1999) argue that: "*experiences are a fourth economic offering, as distinct from services as services are from goods, but one that has until now gone largely unrecognized*". Commercial experiences are even predicted to be the foundation for future economic growth and it is argued that experiences provide higher customer value than services as they engage customers in an inherently memorable way.

<sup>19</sup> The Greek origin for this word, "empatheia" stands for insight, feeling (the National Encyclopaedia).

<sup>20</sup> See the discussion of "the what quality" and "the how quality" in the Grönroos's Model in Section 14.3.1.

<sup>21</sup> They are called "commercial experiences" to separate them from experiences that are "free of charge", as, for instance, a sunny day outdoors or seeing a reindeer in the forest.

Successful commercial experiences seem to have one fundamental characteristic in common: they always leave memories in the mind of the customer. Pine & Gilmore (1999) write: “*while commodities are fungible, goods tangible, and services intangible, experiences are memorable*”. It is further stated that “*the experiences must leave indelible impressions*”, which clearly emphasizes that “memorable” in this context means “remembered” rather than “likely to be remembered”. The fact that experiences create memories might also be the key to their ability to provide uniquely high customer value.

One of the distinctions between commercial experiences and general services is that it is strongly emotional. The commercial experience concept, therefore, has a wider scope than the concepts of goods and services. It should be noted that experience providers by no means have to be service or goods providers even though this might be common. Experience providers can be seen as organizers of value creation – organizers of memorable events (Normann, 2001). The strong engagement factor then appears to be a critical driver of commercial experiences, and the word “engage” is also commonly used by Pine & Gilmore (1999).

#### 1.1.4 A note on quality dimensions

It should be noted that a generic list of quality dimensions, as those illustrated in Figure 1.7 and 1.8, can only give a first set of ideas needed for product planning. Each product, article or service, has to meet its own special set of customer requirements. These needs and expectations have to be thoroughly investigated and should have a major impact on the planning of the work to be performed. Another important aspect is to observe that the importance of the different dimensions may vary with the product. For example, with an aeroplane, operational reliability is considerably more important than appearance, while for a watch, the opposite might be the case. At a surgical operation, the reliability factor is no doubt vital, whereas communication skills may be less important. In teaching, communication skills are paramount, while it is no disaster if the teacher should not immediately be able to answer every question.

## 1.2 The cornerstones of TQM

Nowadays, quality issues are regarded as an integral part of the activities of an increasing number of private as well as public companies and organizations. This is the basis for what is often referred to as *Total Quality Management, TQM*, which, in our interpretation, means “*a constant endeavour to fulfil, and preferably exceed, customer needs and expectations at the lowest cost, by continuous improvement work, to which all involved are committed, focusing on the processes in the organization*”.

We see this as a matter of active prevention, change and improvement rather than inspection and repair. This is sometimes expressed as “*prepare and prevent instead of repair and repeat*”. The quality work is a continuous process, and not a one-off project, and furthermore, developing products and processes but also supporting the personal development of those involved in these processes.

There are many descriptions of the Total Quality Management concept in literature, but few definitions. We see TQM as a holistic concept, where values, methodologies and tools are combined to attain higher customer satisfaction with less resource consumption. This whole concept can be interpreted as a management system, to which discussion we will revert in Chapter 17.

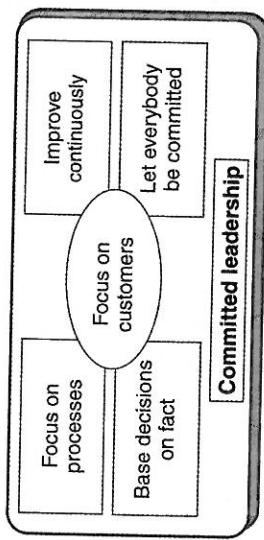
If the company’s work with Total Quality Management is to be successful it must be built on the top management’s continuous and consistent commitment to quality issues. With this in mind, the improvement work shall rest on a culture, based on the following values:

- committed leadership
- focus on customers
- base decisions on facts
- focus on processes
- improve continuously
- let everybody be committed.

In addition, it is important that all these values interrelate, and that a comprehensive picture is created. To separate the values mentioned above from other similar sets of values<sup>22</sup>, we sometimes prefer to talk of the six values above as *the cornerstones of TQM*.

<sup>22</sup> Several other names are used more or less as synonyms, as, for instance, principles and core values.

The cornerstones should then be supported by suitable methodologies and tools into a complete framework. Below we will look further into the meaning of the different cornerstones.



*Figure 1.9 The values, or cornerstones, which are the basis of Total Quality Management. Note that we use an active formulation of the different values in the model in contrast to the often used "passive" formulations. The model has been named the Cornerstone Model.*

### 1.2.1 Focus on customers

A central quality aspect today is to *focus on the customers*. Quality has to be valued by the customers and put in relation to their needs and expectations. This means that quality is a relative term, which to a large extent is defined by the competition in the market. The quality of a product can be experienced as having deteriorated significantly, if a competitive alternative with better characteristics turns up in the market. The crisis in the American car industry in the beginning of the 1980s (and perhaps also in 2009–2010) is a good example of this. In addition, the connection between the needs of the customer and the function and price of the products means a lot for the customer's perception of the product's quality.

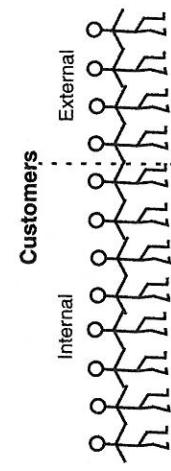
Focusing on customers implies finding out what they want and need, and then to systematically try to fulfil these needs and expectations when developing and manufacturing the product. It is not always easy to ascertain what the customers want, using, for example, market surveys. Often the customers themselves are not able to state their needs, and it takes considerable empathy to understand what they really need. For example, when Toyota was about to launch Lexus, their new luxury model on the American market, they arranged for some of their engineers to live in American families to be able to understand American customer needs properly.

The importance of customization can also be illustrated by the problems of Disney Europe outside Paris. Following the success of Disney World in Florida, a similar theme park was established in Japan, and was

also very successful. From this was concluded that the business idea was universal, like a credit card. However, the Japanese longed to escape into a different way of life for a day, they welcomed the American style. This was not the case in France and Europe, as here people had no wish to buy a day in America. What they wanted was a day at an ordinary amusement park; see Godfrey (1995).

A great many companies and organizations produce goods and services trying to market these without adapting them to the customers' needs and wants. There is a tendency, however, for companies and organizations to tailor-make products to their customers. One example of this is Levi's, which began manufacturing customized jeans. The measurements were sent to the factory, where the jeans were produced according to the individual customer's figures and requirements. The price for customized jeans was approximately USD 8 higher, but sales rose sharply by 30%; see Godfrey (1995). An important component in this approach is that the company acquires a very good understanding of their customers' needs. Information technology and e-commerce provide great opportunities to obtain knowledge about customer requirements, and to aim offers at suitable customer categories. By following up previous purchases and analysing the corresponding customers' other purchases, it is possible to target offers of new relevant products. Within marketing the concept of *Customer Relationship Management, CRM*, is used.

Focusing on the customers does not only apply to the *external customer*. Every employee has *internal customers* within the company; see Figure 1.10. Their needs also have to be satisfied, in order for them to do a good job. It is important in Total Quality Management, with its strong focus on external customers and their satisfaction, not to forget the internal customers, the employees. Total Quality Management is essentially a matter of providing the employees with better opportunities to do a good job, and to feel proud of their performance. This creates a breeding ground for satisfied external customers in the long run.



*Figure 1.10 We have to satisfy both the internal customers within the company and the external customers, who buy, use or in other ways are influenced by our products.*

## 1.2.2 Base decisions on facts

An important element in modern quality philosophy is to *base decisions on facts*, which are well-founded, and not to let random factors be of decisive importance. To do this requires knowledge about variation and the ability to distinguish between “natural variation” and variation due to identifiable causes. Also needed is factual data of both a numerical and verbal character. We have to gather, structure, analyze and decide upon different types of information.

Focusing on customers must not be only a slogan, but requires systematic information about the needs, requirements, reactions and opinions of the customers. Only about 25% of all new products are successful on the market (Kotler, 1997). A possible explanation is that the launch was not preceded by a thorough investigation of what the customers actually want and how much they are prepared to pay for it. Thus, decisions on product development have not been based on well-founded facts. Another cause of failure might be that the company had insufficient knowledge about the product before releasing it into the market, they had missed crucial facts. Frequent recalls exemplifies this problem.

It is also important to have a strategy for making decisions based on facts in relation to manufacturing. Earlier, these facts were rarely used to draw important conclusions about the manufacturing process, even though many facts were collected and a lot of measurements were taken. Measurements were taken to evaluate single units, not to evaluate and improve the manufacturing process in which the units had been produced. Collected data were stored in files, later on tapes or discs, without ever being used. Simple statistical methods have not been used to process and analyze data, an analysis that could have provided an excellent basis for variation reduction within the production process, and thus for achieving improved quality. Basing decisions on facts implies actively looking for relevant information, which is then compiled and analyzed. From the analysis conclusions are drawn, which are used for improvements. In order to work efficiently with improvements, we need to structure and analyze verbal information as well, for instance opinions and feelings.

Simple statistical tools, such as *the Seven QC Tools* (see Figure 1.11), and *the Seven Management Tools*, also referred to as

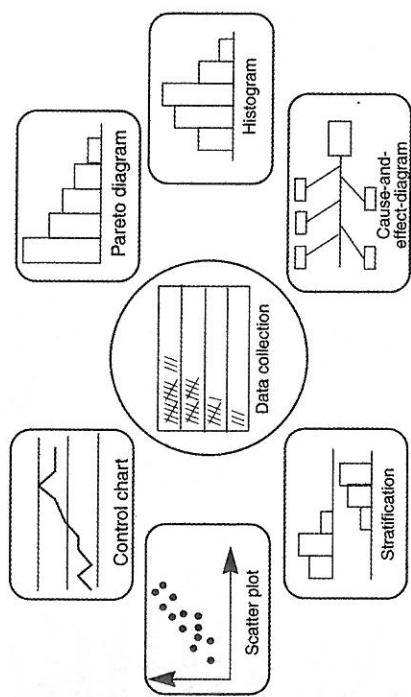


Figure 1.11 *The Seven Improvement Tools mainly intended for structuring and analysing numerical information in order to find improvement possibilities.*

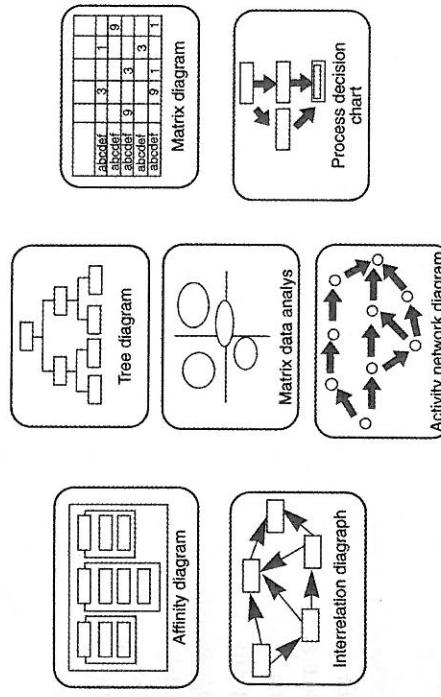


Figure 1.12 *The Seven Management Tools, whose prime function is to help structure and analyze verbal information.*

<sup>23</sup> The Seven Improvement Tools are described in Chapter 10 and the Seven Management Tools are discussed in Chapter 22.

## 1.2.3 Focus on processes

Most organized activities can be regarded as a *process*, i.e. “a network of interrelated activities that are repeated in time, whose objective is to create value to external or internal customers”. The process transforms certain inputs, such as information and material, into certain outputs in the form of various types of goods or services. The purpose of the process is to satisfy its customers with the end result produced, while using as little resources as possible. The process is supported by an organization consisting of people and their relationships, resources and tools. Identifying the suppliers of the process is another important task, and to provide clear signals about what is needed in the process, to minimize resources and to satisfy its customers.

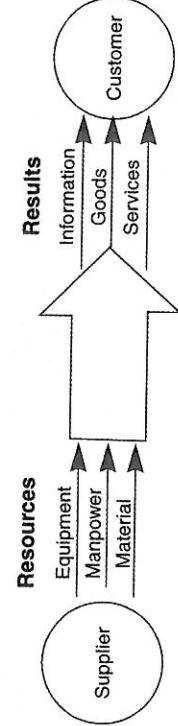


Figure 1.13 A process is a network of interrelated activities that are repeated over time. It transforms certain resources into results that should satisfy the customers of the process with the smallest possible resource consumption.

The process links the past with the future. The process generates data that indicate how well the process satisfies the needs of the customers. With statistical tools and models, it is possible to draw conclusions from the process history about its future results, and to obtain the necessary information to improve the process. The *process view* means not only looking at every single piece of data, such as a measurement result or a customer complaint, as a unique phenomenon. Instead, it should be regarded as a part of the statistics that can provide information about how well the process is working, and how it can be improved<sup>24</sup>. Therefore, it is essential to look at data over time<sup>25</sup>.

Processes are often differentiated into the following three types (see Egnell 1994, and Figure 1.14):

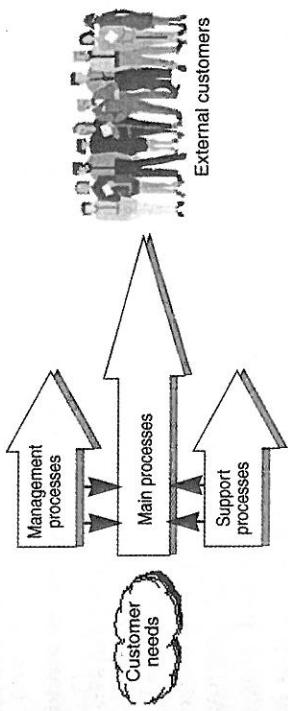


Figure 1.14 An illustration of the processes in an organization, based on their respective task. (From Egnell, 1994)

- *Main processes*<sup>26</sup>, whose task is to fulfil the needs of the external customers, and to improve the products provided by the organization. These processes have external customers. Examples of this type are processes for product development, production and distribution.
- *Support processes*, whose task is to provide resources and support for the main processes. These processes have internal customers. Examples are recruitment, maintenance and information processes.

- *Management processes*, whose task is to make decisions on the targets and strategies of the organization, and to implement improvements in the other organizational processes. These processes, too, have internal customers. This category is where procedures for strategic planning, targeting and auditing processes belong.

### 1.2.4 Improve continuously

External customer demands for quality are growing continuously, new technological solutions appear and new types of business activities are created. Therefore, continuous quality improvements of goods and services produced by the company are vital. *Improving continuously* is an important element in a successful quality strategy. Anyone who stops improving soon stops being good. The symbol of continuous improvement is

<sup>24</sup> The process view is discussed further in Chapter 19.

<sup>25</sup> A suitable tool here is the control chart, one of the seven improvement tools discussed in Chapters 10 and 11.

<sup>26</sup> These are sometimes referred to as “operative processes” and “core processes”.

the improvement cycle “Plan – Do – Study – Act”, which will be referred to frequently in this book, especially in Chapter 9; see Figure 9.3.

**This happens if we accept that 99% correct is sufficient:**

- Nine words are incorrectly spelled at each page in your newspaper.
- Almost four times per year you will not get your daily newspaper.
- You would be without electricity, water or heating about 15 minutes each day.
- At least 8,500 prescriptions would be incorrect each year.
- About 23,700 transfers should each day be made incorrectly to the accounts.
- Drinking water in the waterpipe system would be unusable about 1 hour per month.

Figure 1.15 Example of the consequences in Sweden when accepting that 99% correct is sufficient. (From Hedman & Lindvall, 1993)

Even without any external pressure, continuous quality improvement work is well justified from a cost point of view. Measured costs due to defects and other non-quality contributions are high today. It is not unusual for these to amount to between 10% and 30% of sales (see Section 2.4). In most cases, defects incur other costs as well. If a high rate of disturbances has been accepted, this has to be compensated for by processing many products and large buffer stocks. The corresponding capital costs are not usually registered as costs due to poor quality. Their contribution can, however, represent a considerable part of the total costs.

The Six Sigma methodology, which has led to considerable savings in many companies, is based on statistical methods which are utilized systematically, using facts to bring about continuous improvements<sup>27</sup>.

The basic rule of continuous improvement<sup>28</sup> says that it is always possible to improve products, processes and methodologies while using fewer resources, i.e. to achieve higher quality at lower costs. In many cases very simple steps can bring about dramatic effects in terms of improved quality and reduced total costs. The real challenge is to find these steps.

**The basic rule of Continuous Improvements**

There is always a way to get improved quality using less resources

Figure 1.16 The basic rule of continuous improvements.

- The value of continuous improvements is also a mental picture that everything can be done better than what we are doing today, better in the sense that it provides “better customer benefit” and better in the sense of “with fewer resources”. Thus, what this amounts to is a win-win-effect of benefit to employees, customers and the company alike.

Let us here also comment on the popular motto “Do it right the first time”. This slogan must be interpreted carefully. In order to delight our customers we must be prepared to change to be able to improve. Therefore, we must dare to make some mistakes when improving products and processes. We must realize and accept that mistakes will happen, and try to learn from them. When a mistake has occurred, it is essential to turn it into an asset by using the process information provided, to increase our knowledge about its opportunities for improvement. What must never happen is to focus on finding “scapegoats” when mistakes are made.



Figure 1.17 The Japanese word ‘kaizen’ consists of the symbols ‘kai’, meaning “to change” and ‘zen’, which means “good”. Together this represents “changing for the better”. ‘Kaizen’ is a very common word in Japanese. The term ‘kaizen’ in the quality context was first used by Masaaki Imai (born 1930); see Imai (1986, 1997).

According to Imai (1986, 1997), the Japanese term ‘kaizen’, see Figure 1.17, is a conscious systematic effort to try to bring about continuous improvements. ‘Kaizen’ is sometimes perceived as focusing on small improvements. This should not be understood to mean that methodologies leading to improvements by leaps could not be included in a successful quality strategy. We want to point out that in our view, continuous im-

<sup>27</sup> Six Sigma will be addressed in Chapter 23. See also Section 1.4.

<sup>28</sup> This is close to the quote “There is a better way. Find it” by the American inventor, scientist and businessman Thomas Edison (1847–1931).

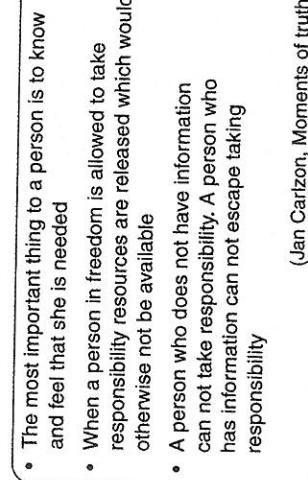
provements could very well include both small and big improvements (often called *innovations* today) – a view we have in common with Juran; see Juran (1964).

Also improvement initiatives under the banner of Lean or Lean Production address continuous improvement of processes, especially by focusing on reducing waste; here “waste” is most often interpreted as expenditures which do not create value to the customers. This type of initiatives will be further discussed in Section 23.5.

## 1.2.5 Let everybody be committed

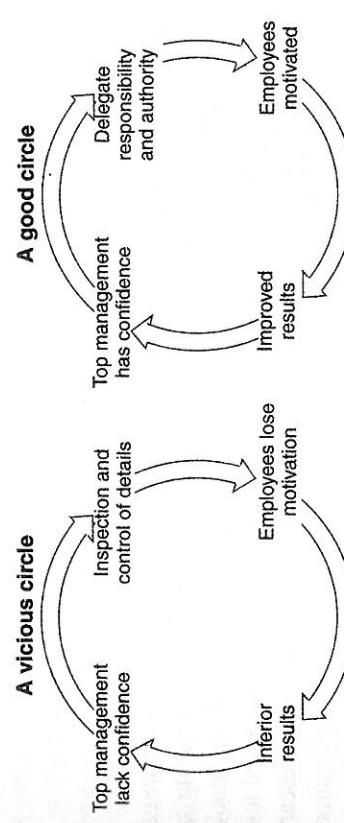
For the quality work to be successful, it is essential to create conditions for participation in the work with continuous improvement. An important means for quality improvements is therefore to facilitate the opportunities for all employees to be committed and participate actively in the decision-making and improvement work. Key words here are communication, delegation and training; see Figure 1.18.

In his book “Moments of Truth”, Carlson (1987) tells the story of two stonemasons who make squared granite blocks. Asked what they were doing, one of them answered tiredly that he was squaring granite blocks, while the other one answered enthusiastically that he was helping to build a cathedral. The employee must have a chance to feel commitment, professional and personal pride, and responsibility, to be able to do a good job.



*Important elements to stimulate participation in an organization are communication and delegation. (From Carlson, 1987)*

The wording for this element aims to communicate a positive outlook on people. Those who are given the chance to do a good job and to feel professional pride, and who are given recognition after performing well, will also be committed to their job. This leads to improved product and process quality. Creating opportunities for participation for all involved means to work actively at removing all the obstacles to commitment, which often exist in our organizations. But it also means that we as individuals have to take responsibility. In this effort to create collaboration, we need to individually develop our self-reliance, conversational abilities, purposefulness, co-creativity and ability to learn from experience; see Eklund & Lund (1999). As a consequence, the management should support and stimulate their employees to develop these and other qualities.



*Figure 1.19 A vicious circle and a good circle, linked to the effect of delegating responsibility and authority.*

Participation and commitment are achieved through the delegation of responsibility and authority. It is important to change vicious circles into good ones; see Figure 1.19. Nowadays, the discussion is not only about creating many job opportunities, but also that these should provide meaningful, stimulating tasks of great responsibility<sup>29</sup>. Job satisfaction is both an important target and a vital means to achieve high quality.

Not only everyone within the company, but also all suppliers of material or components, must be involved in the quality improvement work. An obvious tendency in large companies today is to drastically reduce the

<sup>29</sup> This will certainly be even more important when those born in the 1980s and 1990s (sometimes named Generation Y) enter the job market.

number of suppliers. Instead of choosing the supplier who offers the lowest price, they choose to establish relationships with a small number of suppliers, to achieve increased commitment, responsibility and quality awareness. At the same time, the suppliers are given an increased responsibility for the development and manufacture of various sub systems, and regard this as an interesting business opportunity. Tetra Pak, for example, have cut down the number of its suppliers in the last few years, from around 3000 to 255. IKEA<sup>30</sup> has reduced the number of its suppliers in Europe during the period 1995–2000 by approximately 35%, while their responsibilities have increased and the purchasing volume has virtually doubled. The employee who makes a screw for a car seat probably does not feel that he is helping to build a car, but the supplier who is responsible for the whole seat probably does<sup>31</sup>.

## 1.2.6 Committed leadership

In the bottom of the “Cornerstone Model” in Figure 1.9 is *committed leadership*. It cannot be emphasized too much how important strong and committed leadership is to create a culture for successful and sustainable quality improvements. It should be emphasized here that committed leadership must be practiced on all level of the organization. Many research studies show how important it is to create commitment and engagement from the members of the staff and that managers at all levels of the company are credible, clear and good at communicating and work well as good examples<sup>32</sup>. Joseph Juran<sup>33</sup>, one of the greatest authorities in the quality field, expresses it thus: “To my knowledge, no company has attained world-class quality without upper management leadership”. The top management have to include quality aspects in the company vision, and support activities regarding quality financially, morally and with management resources. The top management must also actively take part in the improvement process. If the management do not show by their ac-

<sup>30</sup> IKEA is a Swedish retailer of furniture and home appliance operating in the global market. In 2008 the IKEA Group had 253 stores in 24 countries with about 125,000 employees. In addition there were some 30 stores owned and operated by franchisees outside the IKEA Group. In 2008 the revenue was EUR 21 billion. IKEA's catalogue was printed in 198 million copies in 27 languages. ([www.ikea.com](http://www.ikea.com))

<sup>31</sup> A more thorough discussion of supplier relationship is given in Chapter 13.

<sup>32</sup> Feedback, confirmation, follow-up, and working climate are often the factors that most strongly influence the joy of work. See, for example, Phillipson (2004).

<sup>33</sup> For more information about Juran; see Section 3.4.

tions that quality is at least as important as, say, direct costs and delivery times, the employees are not likely to embrace that view.

One example of the importance of top management commitment with respect to quality is described in Karatsu (1988). In the 1980s, General Motors and Toyota started co-operating at the NUMMI<sup>34</sup> factory in Fremont, California. Before this co-operation existed, the GM factory had serious business problems. The new management, appointed after the co-operation agreement, concentrated their efforts on providing quality improvement training for all their employees. After some years, the productivity and product quality at the Fremont factory were comparable to the results achieved at Toyota's factories in Japan. Previously the workers were blamed for the inferior quality of American cars. In reality, a lack of commitment and inadequate knowledge within the top management were the main reasons for the problems in the NUMMI factory.

A committed leadership for proactive and progressive quality improvements is based on a visibility and clarity in one's own organization as well as personal commitment. This, in turn, rests on a conviction that Total Quality Management will contribute to development of the organization. In our opinion, this conviction can only be based on personal knowledge and insight as to what it deals with.

## 1.3 The importance of systems thinking

Even if we have structured the operations, we must never forget, in our efforts to make the processes clear, that the various processes are interdependent and affect one another and also interact with the environment, as for instance, customers, suppliers, competitors, and legislators. The processes make up a system, and therefore *systems thinking* on a long-term basis is necessary to achieve success. Systems thinking, or the ability to view things holistically, and see how the various integral parts affect one another, is an important element for successful quality improvements. Senge (1990) introduced a graphic method to describe system effects such as delays and negative or positive feedback and reinforcements; typical

<sup>34</sup> NUMMI = New United Motor Manufacturing, Inc. The plant was opened in 1984. In 2009 GM announced that they would discontinue the joint venture with Toyota, and some months later Toyota announced that it will discontinue its production contract with NUMMI as well.

system structures are called *system archetypes*<sup>35</sup>. Senge regards systems thinking as an essential ingredient in a learning organization<sup>36</sup>.

An important theme in TQM, that has not yet been emphasized sufficiently, is the realization that all involved can become winners. In every buyer-seller relation both parties should feel content when the purchase is concluded. Both parties have benefited from the deal. This is an obvious example of the attitude that Deming (1993) calls *win-win*. All too often in the business world a win-lose relation is created, i.e. what one party wins is lost by the other. This makes everyone a loser in the long run. The cultures that can create win-win relations are the ones that will be most successful in the long run.

To create a win-win relation we have to trust one another. The Japanese Professor Kaoru Ishikawa pointed out that we make people untrustworthy by not showing them enough trust. In doing so we are creating a self-fulfilling prophecy. If we base the co-operation on trust, it is possible to do business on terms that are mutually beneficial.

Deming (1993) stresses that it always pays to expand the system in view. Having up till now only looked at one's own organization, or prior to that, one's own division or function, we can see a clear tendency to expand the vision, so that customers and suppliers are also regarded as important parts of the system. By joining forces to improve the whole system and make it more efficient, all concerned can be winners. This development is partly due to a heightened insight about the win-win perspective, but also to a clear tendency to transfer responsibility for the value adding process to suppliers through outsourcing. The heightened focus on the whole supplier chain is sometimes referred to as *Supply Chain Management*; see Christopher (1998). Today, this point of view goes even further as indicated by the concept of value creating networks; see Normann (2001).

We can see that this systems view is spreading, for example in the form of relations between the private and public sector, mainly in health care and education. An interesting deployment of the systems view is the Swedish project “Progressive Åseda”<sup>37</sup>, where values, methodologies and tools from TQM are used to strengthen the entire community and turn depopulation into repopulation; see, for example, Hellings et al. (1998) and

Fredriksson (2004a,b). “Networks”, where companies or organizations cooperate, is another result of increased systems thinking. The forming of networks is facilitated by the development of the information technology.

## 1.4 TQM, Six Sigma and Lean Production

We look upon Total Quality Management as a holistic framework. Some other frameworks have been launched during the last few decades as well. Among those, the concepts *Six Sigma* and *Lean Production* have become very popular. As we see it, these could be considered as methodologies, or improvement programmes, within our general framework of Total Quality Management.

In Six Sigma, systematic problem solving is emphasized, especially, but not only, when problems occur due to variation in the manufacturing process, variation between customers and their use of the product, and variation in the product's environment. The problem solving procedure within Six Sigma is based on an extension of the PDSA (Plan – Do – Study – Act) cycle mentioned in Section 1.2.4 (and discussed more in Section 9.2). The procedure, often referred to as the DMAIC cycle, has the stages: Define – Measure – Analyze – Improve – Control. Many companies have realized that problems should be prevented during design and development of products, rather than solved in the manufacturing process, or even worse in the usage process of the product. Therefore *Design for Six Sigma* has been advised as a means for problem prevention already during the product development.

Part III of this book contains the necessary ingredients for the statistical problem solving handled in Six Sigma and the different methodologies and tools described in Part II encompasses Design for Six Sigma.

In Lean Production, the more value laden sides of TQM are emphasized. Lean Production relies heavily on employee involvement in reducing waste in the processes (often called “value streams”). Just like Six Sigma, the Lean Production concept first applied to manufacturing processes but later has been enhanced to cover also other sides of the company operations. *Lean Product Development* and *Lean Thinking* are derivatives of this kind. In Chapter 23 a reflection on these different phenomena constituting Six Sigma and Lean will be made.

Interestingly, there has been a debate between proponents of Six Sigma, on one side, and Lean Production, on the other side, which ap-

<sup>35</sup> The word “archetype” comes from the Greek “archetopos”, which means prototype or origin.

<sup>36</sup> Senge's views on learning organizations will be discussed in more detail in Chapter 17.

<sup>37</sup> Åseda is a community in the southern Sweden with about 2,600 inhabitants.

proach should be taken. In fact, they are both, suitably interpreted, possible and, in the long run probably necessary, to incorporate in a common framework like the one we advocate in this book. This insight has led to that the concept *Lean Six Sigma* has been launched as well.

We will return to Six Sigma and Lean Production in Chapter 23.

## 1.5 Notes and references

In the closing section of each chapter we will suggest references for further study on the subjects discussed in the chapter. Obviously, this is a subjective and partly incomplete selection, but our aim is to make it easier for anyone interested to find literature for further reading.

Having discussed the concept of quality in this part of the book, as well as its development and significance in general terms, we will in later sections discuss different methodologies and tools that are put into practice in modern quality philosophy.

Books with a focus on service quality are, for example, Grönroos (2007), Edvardsson et al. (2000), Gustafsson & Johnson (2003), Zeithaml (2009) and Zeithaml & Parasuraman (2004). Edvardsson & Gustafsson (1999) provides a description of research in the quality area (both goods and services) in the Nordic countries. An early book on service quality is Normann (1984). Well worth reading is also Normann (2001). The concept of commercial experiences is discussed by, for instance, Pine & Gilmore (1999) and Eriksson (2009).

In Garvin's classic book "Managing Quality" from 1988 different aspects of the terms quality are presented. Garvin discusses observations of the quality of air conditioning equipment. He found significant differences between different manufacturers, both in terms of internal and external quality. A comparison between Japanese and American producers provides a striking picture of the differences between Japanese and American quality at that time. Similar results have emerged in the car industry; see, for example, Womack et al. (1990) and Dertouzos et al. (1989).

Other books well worth reading, of which some have indeed become classics, about the quality concept in general, and the importance of management commitment in particular, are Deming (1986, 1993), Juran (1951, 1989, 1992), Feigenbaum (1951), Crosby (1979) and Oakland (1999). "Zen and the Art of Motorcycle Maintenance" by Pirzg (1984) is an amusing book providing a philosophical perspective on quality.

Hoyer & Hoyer (2001) introduce and discuss definitions of the quality concept made by various quality experts. For discussions about what Total Quality Management really is and how a successful quality strategy could be formulated and different persons view of the quality concept, see for example, Boaden (1997), Dean & Bowen (1994), Grant et al. (1994), Spencer (1994), Axelsson & Bergman (1999), Hellsten & Kletfjö (2000) and Bergquist et al. (2006).

To conclude, we would like to point out that it is not exactly known when the TQM (Total Quality Management) concept was created, or by whom. Some say that it was created in 1984 when the NALC (Naval Aviation Logistics Command) was about to implement quality improvement according to Ishikawa's ideas in the book "Total Quality Control", but didn't like the word "control". One of the employees, Nancy Warren, is said to have suggested "management" instead. "Deming is talking about management, why don't we call it Total Quality Management?"<sup>38</sup> Others maintain that the origin of the concept is a mistranslation from Japanese, see Xu (1994). In Japanese there is no difference in meaning between the terms for "control" and "management". Park Dahlgaard et al. (2001) contend that the concept may have been created by Armand Feigenbaum, but points out that there is no actual proof of this. William Golomski (1924–2002), a famous American university teacher and consultant in quality management, maintained<sup>39</sup> however, that Koji Kobayashi, former executive at NEC (Nippon Electric Company), was the first to use the term TQM as early as 1974 in his speech of thanks when he received the Deming Prize.<sup>40</sup>



Figure 1.20  
The American consultant and university teacher William Golomski (1924–2002) during a visit at Luleå University of Technology. (Photo: Rickard Garvare)

<sup>38</sup> This version was given to one of the authors by William Latzko in 1998.

<sup>39</sup> Personal communication.  
<sup>40</sup> See Section 21.1.