



United Nations Economic  
and Social Commission for  
Western Asia (ESCWA)

United Nations  
Industrial Development  
Organization (UNIDO)

Association  
of Lebanese  
Industries

Distr.  
LIMITED  
E/ESCWA/ID/1995/WG.1/1  
27 December 1994 C.3  
ORIGINAL: ENGLISH

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**Regional Seminar on Total Quality Management  
Based on ISO 9000**

17-19 January 1995  
Beirut

UN ECONOMIC AND SOCIAL COMMISSION  
FOR WESTERN ASIA  
15 JAN 1995  
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**CONCEPTS OF TOTAL QUALITY MANAGEMENT  
AND THE RELATIONSHIP TO  
ISO 9000\***

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\* The views expressed in this paper are those of the author and do not necessarily reflect those of the United Nations Secretariat.

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- Issued without formal editing.

94-0786



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## **1 From Quality Control to TQM**

TQM as a management philosophy was developed in theory and practice over many years. Already in the early fifties Edward Deming, an American, started to present his ideas to Japanese industry. It was actually the Japanese who first started to implement Deming's ideas of quality management.

It was not before the American industry realized that the Japanese way of producing high quality products really gave them an competitive advantage on the world market that the American industry had a close look at the ideas of quality management.

So while the Japanese called their quality movement Kaizen the Americans - starting their quality movement some time later than the Japanese - called it Total Quality Management.

To see the big time delays between Japan, USA and Europe one just has to look at the prestigious quality awards that each of those regions founded. While the Japanese started their quality award - the so called Deming Application price - in 1951 the US quality award called Malcolm Baldrige National Quality Award was given for the first time in 1987 while finally in Europe the European Quality Award was started as late as 1992.

Of course quality - and it is important for a competitive advantage - is not new. It has been around ever since products were produced on an industrial basis but the basic ideas of how to achieve quality have changed considerably over time and today's ideas of total quality management and Kaizen represent simple yet very powerful ideas that have been proved to be both practical and efficient.

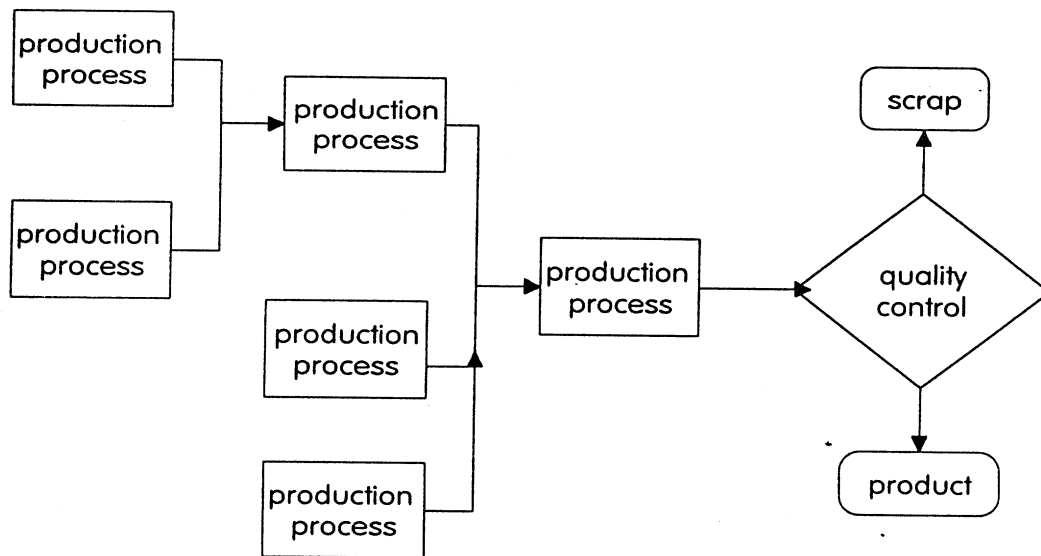
So in this chapter in order to grasp the ideas of total quality management we will give a short overview of how the ideas of quality achievement evolved.

### 1.1 Final Inspection

Already very early in the history of industrial production it became clear that in order to achieve quality there must be some control of products before delivery. That was the beginning of the quality movement with its first step final inspection.

The idea is very simple and presented as a flow diagram in Fig. 1

Fig. 1: Final Inspection



It basically means that at the end of the production process there has to be a controlled point and an inspection of each product before shipment. The result of this final inspection can be twofold. Either the product is acceptable, that means it fulfills the requirements then it can be shipped to the customer or in case the product does not meet the quality requirements it becomes scrap.

## 1.2 Quality Control

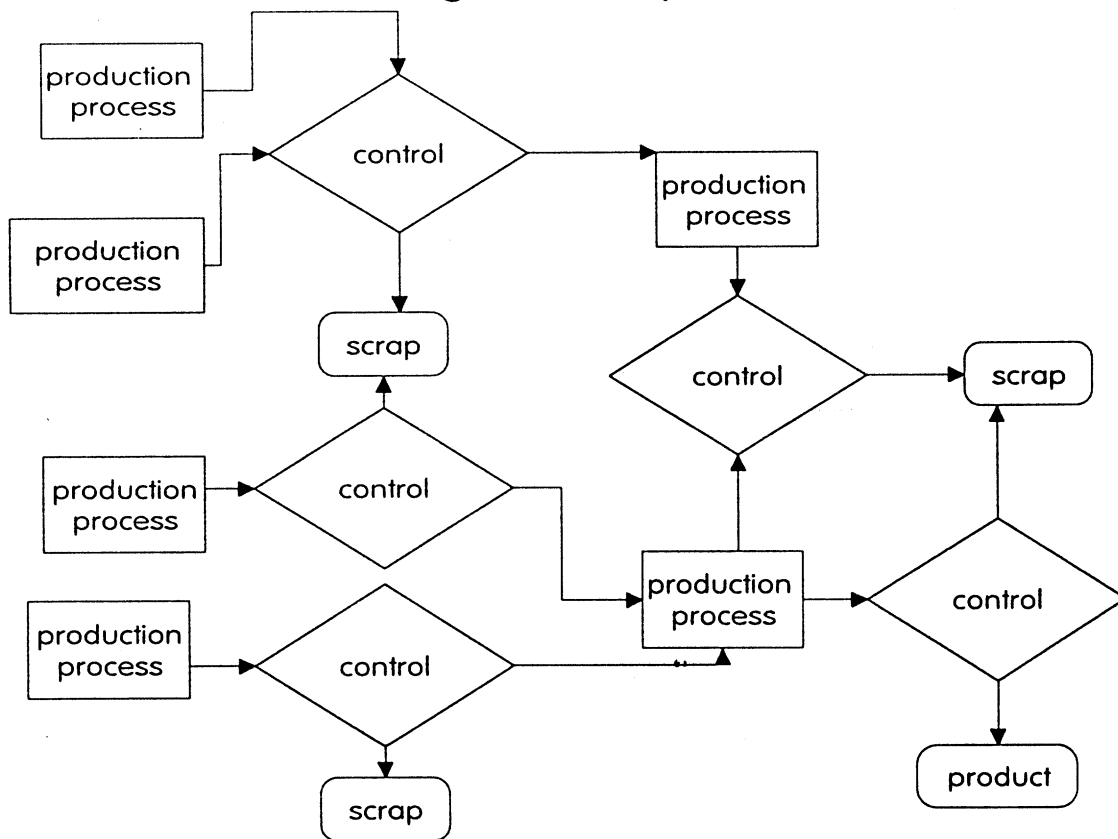
With some experience of applying the concept of final inspection it becomes clear that final inspection does guarantee that only quality products are shipped to the customers but it is yet a very expensive way of achieving quality.

Expensive it is because only at the end of the production process it is decided if a product is meeting the quality requirements or not. So all the costs to produce a specific item are there even if this specific item is scrap.

So the idea coming out of final inspection in order to reduce costs is not only to have final inspection but to have quality control after each production process. This enables to identify items that do not meet quality requirements early in the production process so that these items can be removed from the production process without any extra costs later on in the production process.

The idea of quality control is presented in a flowchart given in Fig. 2.

Fig. 2: Quality Control



Of course many important questions arise in connection with quality control like

*Where should quality control take place in order to minimize the costs of scrap plus quality control?*

*Should each item be controlled or should one use statistical methods for the quality tests?*

### 1.3 Market Oriented Quality Control

So far the customer does not really play a major role in the achievement of quality. In both final inspection as well as quality control the quality of a product is primarily or sometimes only defined by what production thinks the quality of a product should be.

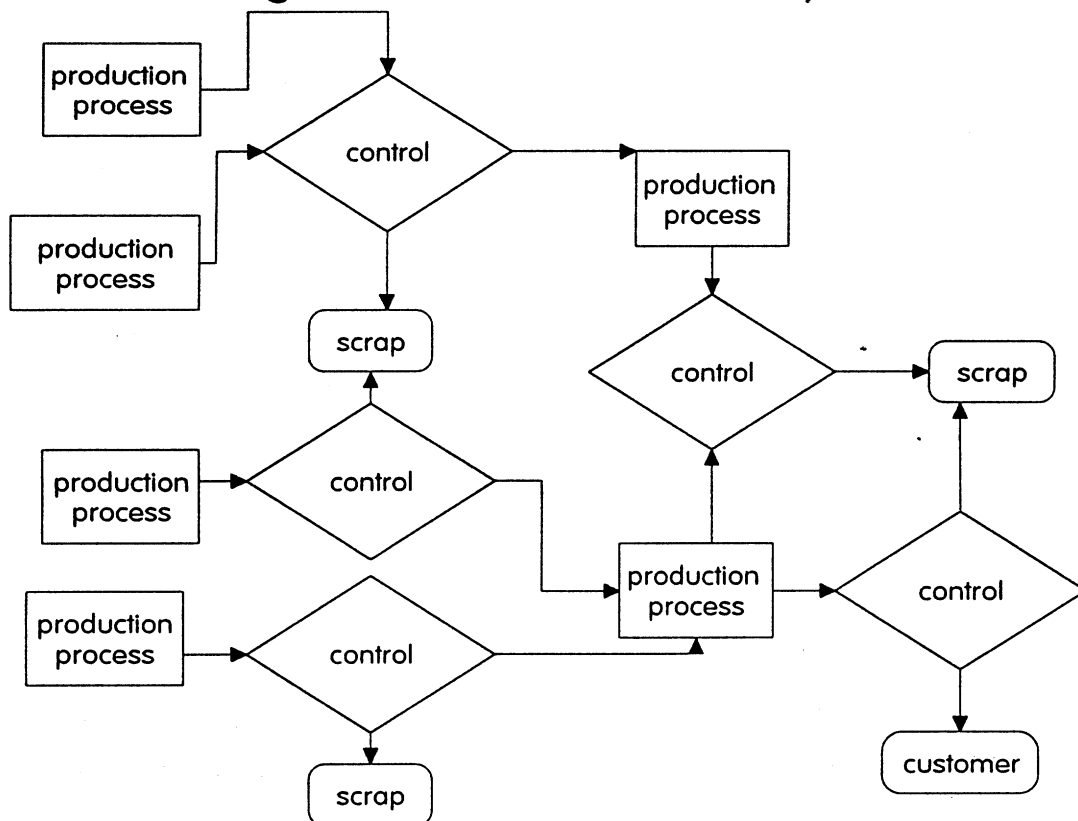
However, what is obvious today was not so obvious in earlier days namely that quality is something that can only be defined as a requirement of the customer not of the production line. So an important step was made, namely to have marketing and sales define what it is that the customers want in terms of quality.

This does not look to be a very important step however in terms of competitiveness on the market it is an extremely important step, because for the first time questions are asked like:

*What is it the customer expects from us?*

*What are the requirements of quality we have to meet on the market?*

Fig. 3: Market oriented Quality Control



1.4 Process Control

So far achieving quality is still a very static concept. A product is either fulfilling the quality requirements and can be shipped to the customer or if it does not meet the quality requirements it becomes scrap. And this is the end of quality control.

But there is an important question to be asked, that was not yet asked before:

*Why was scrap produced?*

And there is of course another even more important question to be asked:

*Can we reduce the production of scrap?*

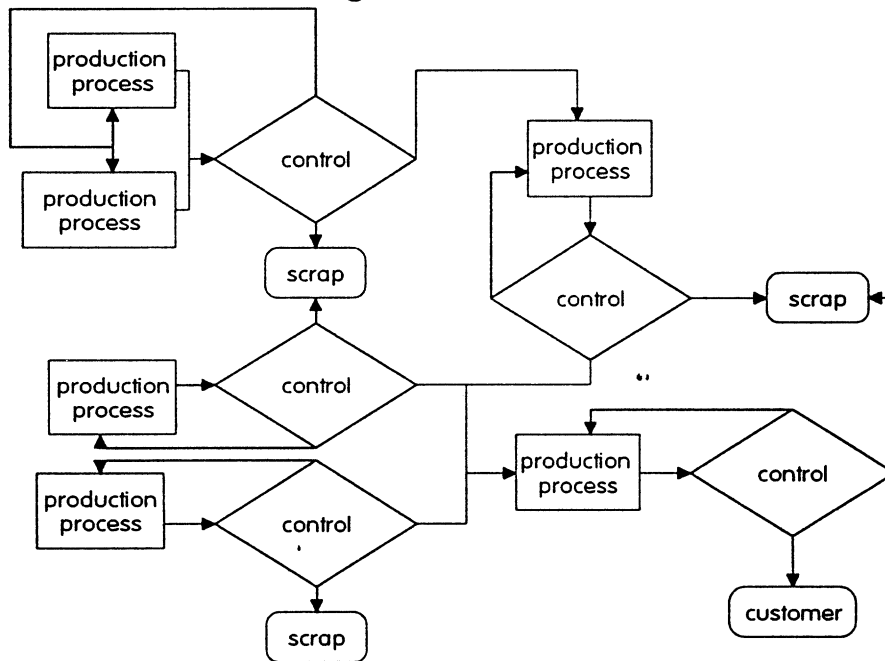
The answer to these two questions is process control. Again its idea is simple but difficult to implement. And there are still many companies who are struggling and trying hard to achieve process control.



The idea of process control is that whenever an item is identified as scrap it is not only removed from the production line but the production process where this specific piece of scrap was produced is analysed in order to find out why this specific piece of scrap was produced and to improve this production process in order to reduce the probability that another piece of scrap will be produced in the future.

The flowchart of this idea is presented in Fig. 4.

Fig. 4: Process Control



### 1.5 Quality Management

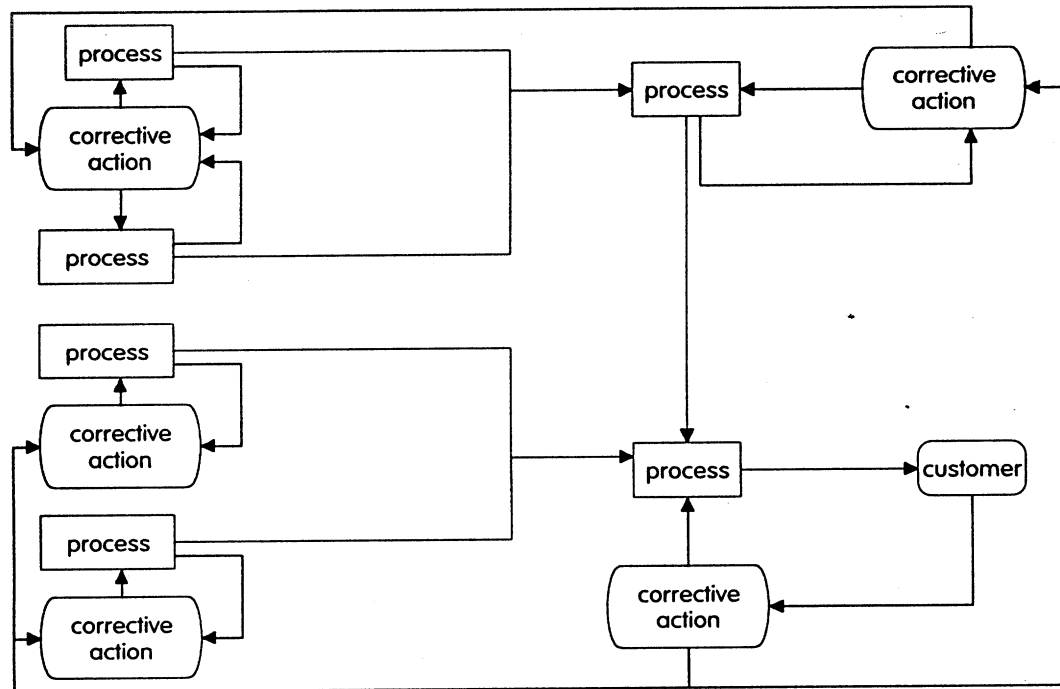
Some companies take the ideas of process control even one step further to quality management. The difference between process control and quality management is the idea not to separate quality control from the production process. In process control we still have at the end of each production process a quality control step. Now with quality management we go one step further and incorporate the control process in the production process.

Now quality control is part of every single activity in the production process and every time it is found out that something goes wrong in the production process corrective actions take place in order to prevent such an occurrence in the future. Such corrective actions are not restricted to production anymore but extend to customers and of course to customer complaints.

Now quality control is not anymore an activity by itself done by other people than those who are involved in the production process but production and quality processes are combined and done by all people in the production process and can not be separated.

To maintain and improve quality corrective and preventive actions take place whenever it is realized that a process might lead to an item that can not meet quality requirements - see Figure 5.

Fig. 5: Quality Management



### 1.6 Total Quality Management

Finally TQM is a management approach of an organisation, centered on quality, based on the participation of all its members and aiming at long terms success through customer satisfaction, and benefits to the members of the organisation and to society. In TQM the concept of quality relates to the achievement of all managerial objectives.

This definition is quoted from the international standard document ISO 8402: Quality Management and Quality Assurance - Vocabulary.

So if we again have a look at quality management in chapter 1.5 the difference between quality management and TQM is that the ideas of quality management are not restricted to production processes any more but are applied to all processes within an organisation including internal services as well as services to customers.

TQM is a management objective that can not be achieved easily, as all those companies who won one of the three prestigious quality awards in Japan, USA or Europe underline. But it is a management objective that guarantees customer satisfaction at low costs and thus gives companies great competitive advantages.

## 2 What is Quality?

Many ordinary words in every day use are used in the quality field in a specific or restricted manner compared with the full range of dictionary definitions due to such reasons as the adoption of quality terminology by different sectors of business and industry to suit their specific perceived needs and the introduction of a multiplicity of terms by quality professionals in different industrial sectors.

The word quality in popular usage often means different things to different people. The most simple yet very practical definition of quality in terms of its use in quality management was given by one of the famous American quality thinkers Philip B. Crosby:

*„Quality is the conformance of a product or a service to requirements.“*

Now this gives rise to considerable confusion and misunderstanding. Because conformance to requirements led Philip B. Crosby to argue that quality costs less. The implication is that satisfying needs „right the first time“ should be very cost effective.

On the other hand the degree of excellence usage implies the opposite sense „that quality costs more“.

An example of this usage is that it costs more to provide and run a five star hotel than a boarding house.

In order to resolve the confusion caused by opposite usages of the word quality another term grade is being emphasized. The term grade is used to describe the sense of technical excellence. Entities, having the same functional use by different requirements for quality, are then defined in terms of category or rank.

## 3 The Basic Rules of TQM

Although the philosophy of TQM is not difficult and appealing there is no easy and golden path for any company to get TQM. However from the experience of those companies who have achieved TQM one can derive some basic rules that have to be met and those rules will be explained in this chapter.

### 3.1 Customer Orientation

In TQM it becomes clear that the orientation towards the customer is crucial. However if one thinks about customer orientation one usually thinks about customers outside the company and therefor customer orientation is something that in many companies lies within the responsibility of sales and marketing only.

But in total quality management one must understand that sales and marketing can not be customer oriented unless they receive the required support from all the other departments within their company.

In traditional management thinking customer orientation is therefor just the responsibility of marketing and sales. However if one views a company also as an organisation where everyone within a company is giving a service or a product to someone else within the company or - in case of sales and marketing - to a customer outside the company then it becomes clear that customer orientation means: Everyone Has a Customer.

TQM can only be practiced if everyone within a company sees his own personal role in the fulfillment of quality requirements or in terms of the definition of quality the conformance to requirements of his own customer no matter if this customer is within or outside the company.

This basic rule of „Everyone Has a Customer“ runs counter to the practice in many manufacturing companies where it is quite common that engineering views itself at the center and most important part of the company or production sees itself as the center and most important part of the company while the basic rule of quality management requires that engineering sees production as its customer and production sees sales as its customer.

### 3.2 Continuous Improvement

TQM is not an objective that can be achieved and then it is done. Rather it is a view that conformance to requirements is something that one can never achieve totally but try to become better and better at it. So the second basic rule means that all the time a company must try to improve its conformance to requirements and the way in which this is done is by learning from the problems.

In TQM a problem is viewed as the most important way to improve conformance to requirement. Sometimes it is also argued that a problem is a treasure if used to learn from it. „Prevent Problems Instead of Solving Them“ is the objective of continuous improvement which the Japanese also call Kaizen.

### 3.3 The Systems Approach

One of Murphy's laws states: Any systems which depends on human reliability is unreliable. There is a very fundamental wisdom in this sentence that is extremely important for TQM. In a traditional company whenever something goes wrong one is looking for the person to be blamed and of course as any company consists of humans you will always find one single person who is responsible for the problem.

But being aware of Murphy's law means that one has to accept the fact that humans are not machines and therefor will make mistakes. So the basic rule in TQM is „Processes Fail, Not People“. This means that it does no good blaming people because blaming people will not improve the processes. The task and the basic rule in TQM is not to find out who is responsible for the problem but what can we do to improve the process so that the problem will not occur in the future. This rule means that in TQM one does not try to understand the past just in order to find out who is guilty but one only tries to understand what happened to learn from it how to prevent such a problem in the future.

One of the most impressive example of the long term results of this basic rule is the operation of flights. Pilots are of course as human as all other people and are therefor bound to make mistakes. One has developed over time systems and processes by learning from airplane crashes so that by now flying is one of the safest ways of transportation.

To achieve this is of course no simple process and takes time. Like in the case of the pilots it is a mixture of training and skills, technical support, design of the airplanes and means of communications with the control tower, but it can be achieved although pilots are humans and humans make mistakes.

### 3.4 Quality as a Shared Value

Everyone has a customer has a very important implication, because everyone in a company has a customer and thus must aim to conform to the requirements of this customers. So, „Everyone is Responsible for Quality“. This important basic rule will only work if there is a clear and shared understanding of what quality means within the company.

Maybe for some it is surprising but it is as fact that in many companies that do not implement TQM principles different people within a company will have very different concepts of what quality means to this company. To give a simple example. If within a manufacturing company production is of the opinion that the most important requirement is to have a failure free product while marketing and sales knows that the most important requirement from the customers perspective is to meet defined schedules and deadlines this different view of quality will finally lead to a situation where the requirements of the customers can not be met.

So quality must be a shared value within the company and a value that is of course derived from the requirements of the customers.

### 3.5 Cost of Quality

In the famous book by Philip B. Crosby „Quality is Free“ Crosby argues very convincingly that quality costs less. The basic assumption behind this rather surprising argument is that if one does not conform to the requirements and thus either has a dissatisfied customer or even is losing a customer this is always more expensive then processes within a company through which quality is achieved.

The costs of quality are defined as all the costs occurred in ensuring and assuring satisfactory quality as well as the losses incurred when satisfactory quality is not achieved.

So if TQM principles are applied the costs of quality should be reduced which is essentially what Philip Crosby means by „quality costs less“.

But to really find out if this is the case costs of quality must be monitored and one can not expect immediate results or short return on investments.

## **4 The Role of Management in TQM**

TQM is a basic philosophy which is not for management alone but has to be applied by all people within a company. However management has an important role to play if TQM comes in to being.

The five major elements are presented in Fig. 6.

Fig. 6: Role of Management in Quality Management

- Responsible for the ongoing improvement of the processes
- Information about quality requirements
- Information about the definition of quality - what kind of products and services
- Encouragement of changes
- Open to problems and new ideas

Management is responsible for the ongoing improvement of the processes. Although improvement of the processes must be done by all people within the company it will not take place if management does not take on responsibility for these processes. In particular, if management, whenever something goes wrong, is primarily looking for someone to be blamed then in many cases people will be very reluctant to bring forward problems and to discuss openly with management possible improvements.

The shared values of quality must be communicated by management. Unless management does not have a clear view of what quality means to the company and what values are important in this respect it can not give this important information to the people.

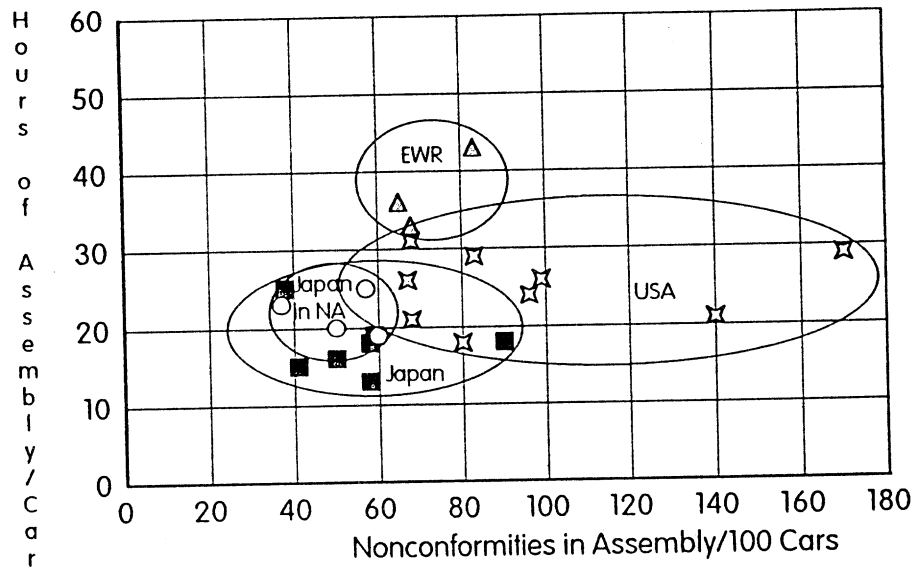
Management must encourage changes. A defensive position where management mostly tries to argue why changes are not wanted nor should be done is counterproductive to TQM. It is along the same lines that management has to be open to problems and new ideas.

In the book of James Womack, Daniel Jones and Daniel Roos „The Machine that Changed the World“ an impressive story is told about long range effects if management is open to problems. It is a story that actually occurred at the company Toyota where production management allowed each worker along the assembly line of the Toyota cars to stop the assembly line when a problem occurred. This was a very revolutionary idea at the time it was first applied because it was completely counter to the practice in American Automobile factories. In the US assembly lines were seen as the most cost intensive part of the car production. So it was the clear objective of production management to have the assembly line running. Any stop of the assembly line was considered as extremely expensive and could therefore only be done by management and not by the workers.

However as it turned out Toyota had of course problems with the production line running at the beginning because any time a worker saw a problem he stopped the assembly line. But this led to a continuous improvement process where eventually the assembly line went so well that in very few cases workers see a necessity to stop the assembly line anymore and the quality of the product could be achieved on the assembly line.

In American assembly lines however the assembly line never stopped. But many problems occurred along the assembly line that had to be removed in time consuming processes at the end of the assembly line. The difference in the result was measured by Womack, Jones and Roos as given in Fig. 7.

Fig. 7: Comparison productivity and quality in manufacturing



Source: International Motor Vehicle Program - World Assembly Plant Survey 1989

### 5 Quality, Quality Management and Quality System in ISO 9000

ISO 9000 is a consequence of the ideas developed in TQM and Kaizen. So ISO 9000 does not add new ideas that are not already present in TQM but rather take some of the presented ideas to a more operational level while ignoring some of them.

In Fig. 8 we present the main definitions concerning quality, quality management and quality system according to ISO 9000.

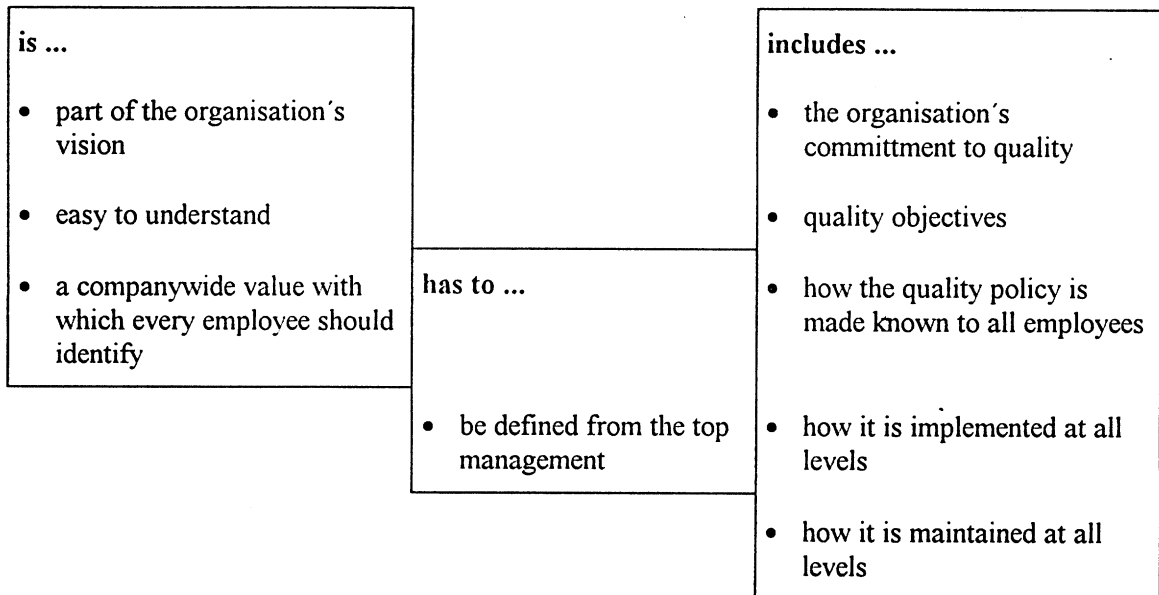
Fig. 8: Definitions according to ISO 9000

Quality - Q	The totality of characteristics of a product or a service that bear on its ability to satisfy stated and implied needs
Quality management - QM	All activities of the overall management function that determine the quality policy, objectives and responsibilities and implement them by means such as quality planning, quality control, quality assurance and quality improvement, within the quality system
Quality system - Q-System	The organizational structure, responsibilities, procedures, processes and resources needed to implement quality management

Quality management and Quality system are the topics of the international standard ISO 9000 series.

As one can see the definitions of quality are not surprisingly basically the same as Philip Crosby's definition of quality for TQM. In Fig. 8 however the new word quality policy is used to define quality management. Quality policy is basically the same as the idea of shared values presented in chapter 3.4. But to be very clear about it we present in Fig. 9 the role quality policy has to play within an organisation according to ISO 9000.

**Fig. 9: Quality Policy**



## 6 Requirements of Quality Systems in ISO 9000

ISO 9000 states some very clear requirements for a quality system. These requirements which we do not want to go in to much detail in this paper are structured in 20 elements given in ISO 9001. Some of the main requirements which are stated in ISO 9001 are given in Fig. 10.



**Fig. 10: Requirements of the Quality System according to ISO 9001**

The supplier shall ...

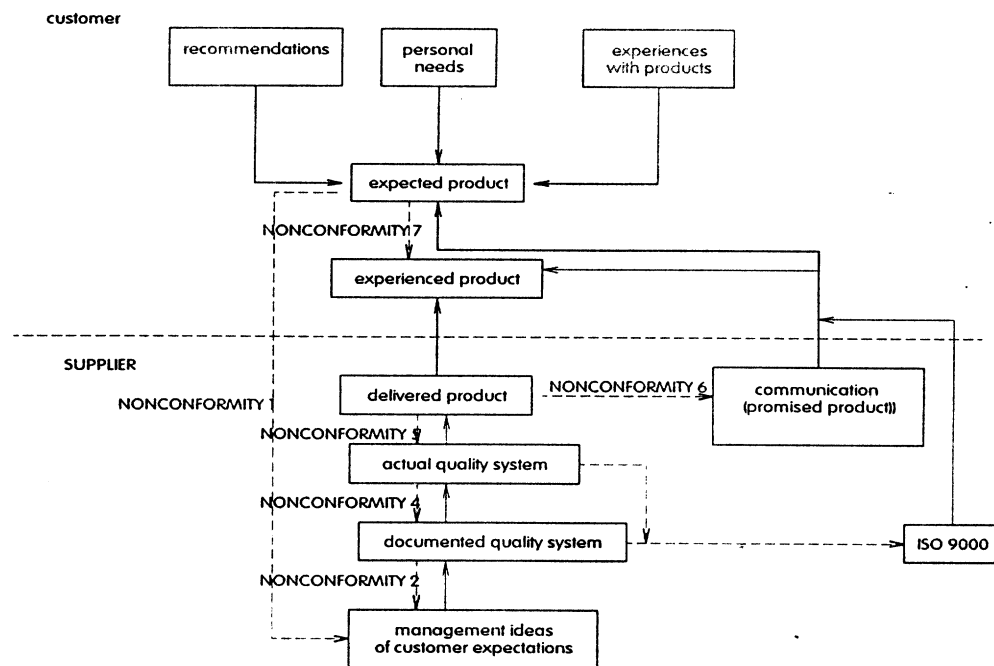
- define its policy and objectives for quality
- ensure that this policy is understood, implemented and maintained
- define the responsibility and authority of all personnel
- identify in-house verification requirements, provide adequate resources and assign trained personnel for verification activities
- appoint a management representative who shall have defined authority and responsibility for ensuring that the requirements of ISO 9000 are implemented and maintained
- carry out a comprehensive system of planned and documented internal quality system audits
- establish, document and maintain procedures for corrective actions
- establish and maintain procedures for identification, collection, indexing, filing, storage, maintenance and disposition of quality records
- select sub-contractors on the basis of their ability to meet sub-contract requirements
- establish and maintain records of acceptable sub-contractors

## 7 Conformity

As we have already described in chapter 2 quality as conformance to requirements is the main and most accepted definition of quality. Of course, conformance to requirements means to meet the requirements or the needs of the customers.

But conformity to requirements also has meaning for a quality system. Because the idea of ISO 9000 is that if the quality system conforms to the requirements of ISO 9000 then this will result in the quality of the product supplied to the customer itself. In Fig. 11 this concept of conformance to requirements of the quality system is charted.

Fig. 11: Conformity



The main objective of any quality system is to have conformity between the expected product and the experienced product. If there is a difference from the customer's point of view this is nonconformity 7 as presented in Fig. 7.

However this can not by no means be directly influenced by the supplier. So the idea of the quality system is to have a sequence of conformities or to put it the other way a sequence of nonconformities numbered 1-6 such that if those 6 nonconformities do not exist than this will guarantee that the nonconformity 7 will also not exist. Nonconformity 1 occurs if the views of the management about customer expectations differ from the expectations of the customer. Nonconformity 2 occurs if the documented quality system does not support the views of the management about the expectations of the customer. Nonconformity 3 occurs if the documented quality system does not conform to the requirements of ISO 9000. Nonconformity 4 occurs if the documented quality system is not really implemented and the actual quality system differs from the documented quality system. Nonconformity 5 occurs if the quality system does not support the production of products of the company. And finally nonconformity 6 occurs if the sold product does not conform to what is communicated about the product to the customers.

## 8 TQM and ISO 9000

### 8.1 The Ideas in Common

The basic management philosophy of TQM and ISO 9000 are the same. If ISO 9000 is done the right way the results should be the same as in the case of implementing TQM. This is important to stress because sometimes the idea is communicated that TQM is more than ISO 9000 or that ISO 9000 is a prerequisite of TQM. But although this might be true it is not a result of the ideas but rather a result of the practice of ISO 9000 which to some respect differs to the practice of TQM.

### 8.2 The Differences

There is in fact one major difference between ISO 9000 and TQM and that lies in the motivation for starting to implement either ISO 9000 or TQM in the first place. The fact that ISO 9000 is a standard and that such a standard can be audited by institutions who have the accreditation to certify quality systems leads companies to start ISO 9000 projects primarily to achieve an ISO 9000 certification. There are very good reasons for having such a certificate especially in Europe where companies require from their suppliers ISO 9000 certificates and also where within the EU government political pressure is put on companies to have ISO 9000 certificates especially if they are bidding for public tenders.

Of course if companies start projects to implement ISO 9000 primarily with the objective to have an ISO 9000 certificate then this a fundamentally different approach than a company starting a TQM project whose only goal is to improve customer satisfaction. Now although ISO 9000 has also as its objective to achieve customers satisfaction this does not mean that this will really be achieved if an ISO 9000 project is geared towards the ISO 9000 certificate as its prime goal.

So what we at the moment experience in Europe is that there are companies around who really wanted as quick and with as little costs as possible an ISO 9000 certificate and did never really care about the basic ideas and philosophy of ISO 9000 towards quality. This remains the main difference to TQM projects because right now there is no possibility of achieving a certificate for TQM unless one participates in one of the three quality awards of Japan, US or Europe.

But those quality award are given to the best among all applicants and not like ISO 9000 to everyone who needs certain requirements. So although ISO 9000 projects and TQM project should in principal lead to the same results this is as we know today only true if management starts an ISO 9000 project with the same motivation and ideas than it would start an TQM project. As long as companies try to achieve an ISO 9000 certificate as the main and only objective for an ISO 9000 project then what it will really achieve is a certificate only and not customer satisfaction.

**9      References**

- Crosby P.: Completeness - Quality for the 21st Century. New York, Plume 1994
- Crosby P.: Quality is free. New York, Mc Graw Hill 1979
- Deming E.: Out of the Crisis, MIT 1988
- Feigenbaum A.: Total Quality Control. 1986
- Imai M.: Kaizen. New York, McGraw-Hill 1986
- Ishikawa K.: Guide to Quality Control. 1989
- ISO: ISO 9000 Compendium - International Standards for Quality Management. Berlin, Beuth 1993
- Juran J.: Quality Control Handbook. New York, Mc Graw Hill 1989
- Senge P.: The Fifth Discipline - Fieldbook. New York, Doubleday/Currency 1994
- Tunks R.: Fast Track to Quality: A 12-Month Program for Small to Mid-Size Companies. McGraw Hill 1992
- U.S. General Accounting Office: US Companies Improve Performance through Quality Efforts. Washington DC, GAO/NSIAD-9-190 (May 2) 1991
- Womack J., Jones D. & Roos D.: The Machine that Changed the World. Rawson 1990

