<table>
<thead>
<tr>
<th>Title</th>
<th>Setting up TQM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author(s)</td>
<td>Heidenreich, Arnold.</td>
</tr>
<tr>
<td>Citation</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>1996</td>
</tr>
<tr>
<td>URL</td>
<td><a href="http://hdl.handle.net/10220/2771">http://hdl.handle.net/10220/2771</a></td>
</tr>
<tr>
<td>Rights</td>
<td></td>
</tr>
</tbody>
</table>
Setting Up TQM

- What does Quality stand for?
- What does Quality cost?
- Return on Quality
- Quality Techniques
- TQM - Setting up Elements
- Main Principles of TQM
Defining Quality

- Quality is a predictable degree of uniformity and dependability, at low cost and suited to the market  
  Deming
- Quality is fitness for use  
  Juran
- Quality is conformance to requirements  
  Crosby
- Quality is in its essence a way of managing the organisation  
  Feigenbaum
- Quality is correcting and preventing loss, not living with loss  
  Hoshin

Quality means meeting customer's requirements, formal and informal, at lowest cost, first time every time

What does Quality stand for? (1,1)

Quality not only refer
- to Products or Services
  but also
- to processes,
- to employees and their working conditions
- to environment and the use of resources and
- mainly to the customer's needs
What does Quality stand for? (1.2)

- oriented to products & services
- oriented to customers' needs
- oriented to processes
- oriented to employees
- oriented to environment

Quality is not just a technical function or department,

Quality is a systematic process inherently in the whole company.
What does Quality stand for? (3)

Quality needs an organisational framework which ensures the quality of each place of work as well as the work between departments and external partners.

The idea of continuous quality improvement cannot be limited to production it has to cover all areas in an organisation.
What does Quality stand for? (5)

The needs of your clients are the one and only quality scale - not the interests of marketing or production.

What does Quality stand for? (6)

Extensive quality improvements can only be achieved when everyone makes an effort and not through the efforts of a few specialists.
Quality Points of View

Product point of view

User point of view

Transcendental point of view

Price / value point of view

Process point of view

Product oriented Point of View

- Quality is precise und can be measured
- With over evaluation:
  "Quality for any price, money is no object"
Costumer Point of View

- Quality is relative
- Individual consumers have different wishes and needs

Transcendental Point of View

Quality cannot be precisely defined and is subjective
"I know when I see it"
Process Point of View

- Product quality depends on quality processes
- Product manufacturing processes are in the foreground

Price / Value Point of View

Quality is shown through value and price
- A quality product meets demands for an acceptable price
- Reach specified agreement for acceptable cost
  - target costing
Key to successful Business

Drastic leaps in productivity

and

profit improvement

through:

- Price / Value Point of View
- Process Point of View

What does Quality Costs?

• Record quality oriented costs
• Quality oriented costs as a management instrument
Classification of Quality Costs

Traditional
- Costs to prevent errors
- Costs for checking goods
- Costs due to failure
  internal / external

Future
- Cost of conformance
  Costs to reach agreement
  - incline in value
- Cost of non-conformance
  Costs due to deviation
  - decline in value

Benefits of new Classification

Traditional division
- Past oriented
- Client aspects not taken into account
- The expression "quality costs" is difficult to define and therefore not properly understood
- A lot of time and energy necessary to define quality costs

Future division
- Future oriented
- Client satisfaction first and every time
- Quality is seen as an integrated part of the process
- Identification or comparison numbers can be established with ease
Activity Based Costing (1)

Stages:
- select Process
- identify inputs and outputs, suppliers and customers
- identify key activities
- for each activity define
  Cost of conformance and
  Cost of non-conformance

Process cost model can form the basis for internal benchmarking overtime

Targets:
- reach a satisfying cost transparency
- find out what causes and increases costs (cost driver)
- show effective ways to reduce costs
- plan and implement measures

Questions:
- what information is needed?
- what information is already available?
- what information has still to be acquired?
The Management Consultants to Media, Printing, Packaging

Return on Quality

Viability improvement through TQM

Employees

Capital

Quality Techniques

Return on Quality

Creation of value & waste of value

Quality of costs

Quality of product

Quality of work

Quality of leadership

Quality of processes

Quality of price

ATTENTION: The Singapore Copyright Act applies to the use of this document. Nanyang Technological University Library
Wastefulness

- It is not necessary to fulfill criteria which the client does not want
- All business processes have the chance to get rid of ballast.

Creation of Value Process

Best Practice
"Lean"
waste of work

primary work
support work

wasteful work
useless work

customer view
Creation of Value Process

- primary work (planned)
  - increasing value
  - processing operations
  - refine process
  - mounting procedure

- support work (planned)
  - no value increasing
  - make ready procedure
  - put in and take out work
  - check quality regulations
  - change tools
  - appropriate transport

- useless work (non-planned)
  - no value increasing
  - sort good from bad
  - unnecessary long transport routes

- waste work (non-planned)
  - decreasing value
  - repairing work
  - destroy value
  - waste
Identification Systems

- **DuPont System ROI**
  Identification: Return on capital investment

- **ISO diagramme**
  Identification: gain per cost ratio

- **Return on Quality (RoQ) - Diagramm**
  Identification: Profit as quality

---

**DuPont System - ROI**

**Return on capital investment**

\[
\text{ROI} = \frac{\text{Profit}}{\text{Turnover}} \times \frac{\text{Turnover}}{\text{Invested capital}}
\]

- **ROI** return on investment
- **Capital turnover**
- **Turnover profitability**
- **Current assets**
- **Property financial assets**
- **Manufacturing costs**
- **Sales costs**
- **Warehouse & despatch costs**
- **Admin. costs**

\[
\begin{align*}
\text{Inv} & = \text{Claims} + \text{Liquid funds} \\
\text{Inv} & = \text{Land} + \text{Property financial assets} \\
\text{Inv} & = \text{Manufacturing costs} + \text{Sales costs} + \text{Warehouse & despatch costs} + \text{Admin. costs}
\end{align*}
\]
ISO - Diagramme

- **Improve gain / cost ratio**
  - Increase gains
  - Reduce costs
  - Market new products / services
  - Improve marketing of existing products / services
  - Reduce cost of conformity
  - Reduce cost of nonconformity

- **Return on Quality (RoQ) - Diagramm**
  - **RoQ** Profit as a quality function
  - Increase value for client
  - Price
  - Price minus costs
  - Cost
  - Reduce costs for extra work due to mistakes and waste production
  - Product according to customer wishes
  - Pleasant customer contact
  - Price policy, not product and competition oriented
  - Define target costs (price minus profit)
  - Employee leadership - trust management
  - Emphasize qualification
  - Simultaneous engineering
  - Manufacturer design, assembly design
  - Benchmarking
  - Single sourcing
  - Just-in-time JIT supplying
  - Lean finishing
  - Total productive maintenance
  - Continuous improvement process CIP
  - Model with changed working time
  - Use quality techniques
The Management Consultants to Media, Printing, Packaging

Product according to customer needs

**add value through ...**

- delivering product according to client's wishes
- anticipating clients wishes and exceeding them not disappointing him
- offering reliability

**Necessary steps**

- Translate customer language into "engineer" language QFD-HoQ
- Ensure qualitative construction, robust design
- ensure qualitative finishing and mounting

Improved Costumer Relationship

**through ...**

- Customers feel satisfied and "at home"
- increased customer bonding
- willingness to forgive a mistake
- good word of mouth good image and reputation

**Necessary steps**

- Choose positively inclined employees
- train employees and underline the importance of customers
- measure customer satisfaction
- carry out benchmarking
- Strategic planning of customer contact
Price Policy, Product and Competition oriented

Fairness

- Strategic and fair
- in relation to the product value and competition

Define Target Costs (price minus profit)

- With strategically defined Price and
- planned Profit expectations
- target costs are put in frame

Large scope lies is reducing and eliminating
- useless work and
- wasteful work

Potential savings can be achieved through optimising
- support work and
- primary work
### Employee Leadership and Trust Management

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Absence from place of work is reduced</td>
<td>• Make the company targets clear to the employees and convince them of their necessity</td>
</tr>
<tr>
<td>• decline in resignations through increased responsibility awareness and motivation</td>
<td>• Delegate part responsibility to each and every job</td>
</tr>
<tr>
<td>• Less mistakes</td>
<td>• Avoid disappointments</td>
</tr>
<tr>
<td>• Excellent representation as each employee supports the company to the best of their abilities</td>
<td>• Encourage employees, support - coach</td>
</tr>
<tr>
<td></td>
<td>• Continuity of management style should there be a change in management personnel</td>
</tr>
</tbody>
</table>

**Advantages**
- Absence from place of work is reduced
- Decline in resignations through increased responsibility awareness and motivation
- Less mistakes
- Excellent representation as each employee supports the company to the best of their abilities

**Requirements**
- Make the company targets clear to the employees and convince them of their necessity
- Delegate part responsibility to each and every job
- Avoid disappointments
- Encourage employees, support - coach
- Continuity of management style should there be a change in management personnel

### Employee Qualification

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Meaningful work is more enjoyable and motivating</td>
<td>• Delegate and offer the opportunity to take part in and be responsible for decisions by all levels</td>
</tr>
<tr>
<td>• Sense of responsibility leads to indispensability</td>
<td>• Underline the necessity and purpose of each job, turn functional &quot;team&quot; into a purpose &quot;team&quot;</td>
</tr>
<tr>
<td>• Reduced absenteeism in motivated employees</td>
<td>• Improve the qualification of the employees to match the requirements of their place of work &quot;learning on the job&quot;</td>
</tr>
<tr>
<td>• Fewer substitutes for absentees are necessary</td>
<td>&quot;Job rotation&quot; to widen horizons</td>
</tr>
<tr>
<td>• Make full use of the potential intelligence of the machine operators</td>
<td></td>
</tr>
</tbody>
</table>

**Advantages**
- Meaningful work is more enjoyable and motivating
- Sense of responsibility leads to indispensability
- Reduced absenteeism in motivated employees
- Fewer substitutes for absentees are necessary
- Make full use of the potential intelligence of the machine operators

**Requirements**
- Delegate and offer the opportunity to take part in and be responsible for decisions by all levels
- Underline the necessity and purpose of each job, turn functional "team" into a purpose "team"
- Improve the qualification of the employees to match the requirements of their place of work "learning on the job"
- "Job rotation" to widen horizons
Simultaneous Engineering

<table>
<thead>
<tr>
<th>Savings</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Period of development becomes shorter</td>
<td>• for interdepartment / area communication:</td>
</tr>
<tr>
<td>• Production time is reduced</td>
<td>• Focus on product finishing quality by</td>
</tr>
<tr>
<td>• &quot;Time to market&quot; is reduced</td>
<td>• use the QFD/HoQ and other quality techniques to reach a smooth running finishing process as early as possible</td>
</tr>
<tr>
<td></td>
<td>• Train construction and planning employees in the use of quality techniques</td>
</tr>
<tr>
<td></td>
<td>• Introduce quality controlling</td>
</tr>
</tbody>
</table>

---

Design for Manufacture, Design for Assembly

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>• uncomplicated construction</td>
<td>• construction, planning and company engineers work &quot;Hand in Hand&quot;</td>
</tr>
<tr>
<td>• fewer parts, fewer joining operations</td>
<td></td>
</tr>
<tr>
<td>• flawless construction</td>
<td></td>
</tr>
<tr>
<td>• complexity management</td>
<td></td>
</tr>
</tbody>
</table>
### Benchmarking

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>• use solutions which have been successfully tested</td>
<td>• intelligent searching; combine available details and deductions as a whole</td>
</tr>
<tr>
<td>• learn</td>
<td></td>
</tr>
<tr>
<td>• avoid being &quot;led up the garden path&quot;</td>
<td></td>
</tr>
</tbody>
</table>

### Single Sourcing

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Đ technical product discussions</td>
<td>careful choice of reliable supplier who can supply quality</td>
</tr>
<tr>
<td>Đ price negotiations</td>
<td>Đ system audit</td>
</tr>
<tr>
<td>Đ Disposition</td>
<td>Đ product audit</td>
</tr>
<tr>
<td></td>
<td>Đ trust management</td>
</tr>
</tbody>
</table>

only with one supplier
### Just in Time (JiT) supplying

<table>
<thead>
<tr>
<th><strong>Savings</strong></th>
<th><strong>Requirements</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Control incoming goods</td>
<td>• careful choice of reliable supplier who can supply quality</td>
</tr>
<tr>
<td>• check personnel</td>
<td>• system audit</td>
</tr>
<tr>
<td>• check working capital</td>
<td>• product audit</td>
</tr>
<tr>
<td>• check working area</td>
<td>• trust management</td>
</tr>
<tr>
<td>• Intermediate material store</td>
<td></td>
</tr>
</tbody>
</table>

### Just in Time (JiT) finishing, Lean Production

<table>
<thead>
<tr>
<th><strong>Savings</strong></th>
<th><strong>Requirements</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Lower material costs due to shorter throughput times</td>
<td>• Machine ability</td>
</tr>
<tr>
<td>• Mistakes</td>
<td>• Process ability</td>
</tr>
<tr>
<td>• <strong>Resulting out of mistakes</strong> Waste</td>
<td>• Employee qualification</td>
</tr>
<tr>
<td>• <strong>Resulting costs due to mistakes</strong> Sorting, Additional work, Acquiring additional material, Cover note for additional work, Personnel costs for additional work, ...</td>
<td>• Delegate responsibility</td>
</tr>
</tbody>
</table>
Total Productive Maintenance

Savings
• Production loss due to machine defects
• Spare part
• Personnel for overtime and extra shifts
• Quality defects caused by equipment "wear and tear"
• Shortened makeread and tool changing time
• Conventional fines for not keeping within the deadlines

Requirements
• Systematic maintenance
  Servicing
  + Inspection
  + Repair
  \( \approx \) maintenance
• Machine operator qualification
• Decentralised machine operator responsibility for machine service

Continues Improvement Process CIP

Uses
• Use the problem solution capacity in the executive level
  \( \approx \) weekly meetings lasting 1.5 -2 hours
  \( \approx \) By analysing mistakes (Q7) improvements can be worked out
  \( \approx \) Results should be reached in 5 weeks

Requirements
• Make the employees aware of problems and use this as a basis for changes which the employees want
  • Organise team work
    \( \approx \) schedule, length, space, aids
• Train Moderators
• Training in the use of elementary tools Q7
Change in Model of Working Hours

**Problem situation**
- Personnel is no longer needed once leaner structures have been achieved

**Requirements**
- Innovative work models
  - make the fact public that the actual working time is reduced
- Social plans for redundancies
  - management and economic solutions

Use Quality-Techniques

**Savings**
- Shorter product development period
- Lower production start-up costs
- Lower waste rates due to quality processes
- Lower guarantee costs due to more mature constructions, no trial and error phase

**Requirements**
- A positive attitude and acceptance of quality techniques
- Make use of results
- Use quality techniques as decision basis for pushing through applications
- Train employees in their special areas
Learn how to use Quality-Techniques

Quality Function Deployment / House of Quality (QFD / HoQ)

Analysis tools (Q7)

Management tools (M7)

QFD - Quality Function Deployment (1)
HoQ - House of Quality

Correlation matrix

Relations

Realisation functions

Costumer requirements

Specification

Result

Competitive scenarios, customer pressure
QFD - Quality Function Deployment (2)
HoQ - House of Quality

I. QFD - Product
What do the customers want, what are they looking for?

1. assess customer requirements
2. compare with customer wishes
3. build scenarios of realisation and let customer compare with the other competitors
QFD - Quality Function Deployment (4)
HoQ - House of Quality

What's the best way towards realisation?

4. search for realisable functions which meet customer requirements
5. bring both together in correlation
6. look for relations between the functions (conflict or support)
7. compare your own functions with those of the competitors

Quality Circle

- consisting of 5 to 12 people who work together in one process
- voluntary work
- identify problems in own processes and the interface to neighbouring processes
- collect data
- analyse problem
- hold open discussions
- fast implementation using own initiative
The Management Consultants to Media, Printing, Packaging

Goal of Quality Circle

• to encourage quality awareness
• to improve quality in all areas
• to encourage responsibility for working place
• to motivate employees
• to improve quality of work place
• to use new ideas and techniques

Quality Circle - Improve Place of Work

• organise own place of work
• Use employee creativity, talents and know-how
• Discover hidden abilities
• Further development of own abilities
• Work in groups
• Lern together and help one another
• Acknowledge good work
Quality Circle - Success Factors

- Management interest
- Voluntary participation
- Acknowledgment of employees
- Integrated training
- Team work
- Problem solutions
- Continuous improvements

TQM - Setting up Elements

Management commitment & Management behaviour as an example
TQM improvement team
Quality management system
Quality techniques
Quality tools

TQM main principles
Management Commitment

- Continued support for the TQM process in the company

- Set an example of continuous Quality improvement in the every day job

Management Commitment

Detail (1):

- willingness to devote resources to be able to carry out TQM
- participation in TQM seminars and training for everyone on all levels
- the result of TQM as a standard part of any financial meeting
- TQM as a part of every general meeting
- regular internal audits of TQM in all areas of the company
Management Commitment

Detail (a):

- recognition of outstanding performance in carrying out TQM processes:
  - invitation of the team
  - personal commendation
  - award the TQM prize
- regular comments and opinion of TQM in internal and external publications (company journals, press releases)
- decision are determined strongly by Quality perspectives recognisable by all
- there are always improvement projects for your own work, whose results are clear to the employees
- leadership is clearly goal oriented and involves employees in the decision making process.
Change of Management Behaviour

The employees of the company are the centre point of TQM efforts, because they must use TQM on a daily basis at work.

Behavioural changes (1):

- employees should be seen as assets - not as cost factors (human resources)
- find out why mistakes happen - not to prove guilt
- prevent failures - instead of - tolerating them
- management through worker participation, involving them - not managing with rules and regulations ("coaching" - not control)
- workers are allowed to decide according to their aspiration
- the decision making process should function on a level of competence

Change of Management Behaviour (2):

- Manage with facts and figures - not with assumptions
- Encourage improvement activities - do not stop them
- Work in processes - not in area optimisation
- Constant communication - not random comments
- Practised TQM is a part of the daily work - not an extra job

Total Quality Management demands the inclusion of all employees in the company. This is achieved through:

- a cooperative management style
- Management behaviour should set an example
Change of Management Behaviour
Problem areas with middle management

The implementation and practical use of TQM meets serious difficulties in the middle management level. For the success of TQM it is therefore necessary that:

• the reasons for this phanomena have to be found
• and eliminated

Following the introductory training there are two large factors which cause uncertainty:

• fear of losing authority
• fear about the future security of their position

An open information policy from the top management can help to reduce these fears. This is recommendable as fear can only be reduced over a longer period of time.

Supervisors and TQM Promoters support the management:

• The necessary resources (money and priorities) should be decided early in the introductory training period to begin with TQM

• The improvement projects which are defined during the training period should be worked on with the help of the TQM promoters and the TQM tools

• TQM results immediately become a part of all problem or result discussions
Change of Management Behaviour
Problem areas with middle management

Supervisors and TQM Promoters support the management:

• The quality policy for each area is derived, implemented and made public from the quality policy of the next higher (superordinate) area

• The internal customer / supplier relationship with the supervisor and the neighbouring process is examined and the necessary corrections are carried

• The new attitude towards mistakes is immediately practised by the supervisors

• Regular TQM audits are arranged on a friendly basis with supervisors

Quality-Management-System

Primarily Quality has to look after the Quality management system ISO 9004 and not the product as in the past

Requirements:

• Conception and constant actualisation of the Quality management system in the total company

• Discover and implement useful quality ensuring methods and tools

• "Know How" centre for all quality related questions

• Management and employee consultation in all questions of quality

• Collaboration in drawing up the yearly quality targets and the definition of measurement scale
Quality-Management-System

Requirements:

• Carry out "Controlling" for company performance
• Regular publication of targeted improvement results
• Carry out internal audits
• Internal customer representation
• External quality management representation

TQM Organisation
The Management Consultants to Media, Printing, Packaging

TQM Steering Group

Total Quality Management realised once it is an essential part of the daily work for all employees in the company. Until this point of time management must offer supportive accompaniment.

The TQM steering process should be carried out by an already existing management group.

Task:
- Planning support,
- steering support and
- controlling support of the TQM implementation process

Main Principles of TQM

- Requirements must be agreed for both internal and external customers.
- Customers' requirements must be met first time, every time.
- Quality improvement will reduce waste and total costs.
- There must be a focus on the prevention of problems, rather than an acceptance to cope in a fire-fighting manner.
Main Principles of TQM

• Quality improvement can only result from planned management action.
• Every job must add value
• Everybody must be involved, from all levels and across all functions
• There must be an emphasis on measurement to help to assess and to meet requirements and objectives

Main Principles of TQM

• A culture of continuous improvement must be established
• Continuous includes the desirability of dramatic leaps forward as well as steady improvement
• An emphasis should be placed on promoting creativity