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Kaizen approach

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Objective of the module: Master the Kaizen approach to be able to:

- improve the functioning of processes on a daily basis
 - make work more attractive for everyone
 - always better satisfy the stakeholders

1 Kaizen approach

1.1 History

True story

In the code of King Hammurabi of Babylon (1730 BC), we find one of the oldest written traces of quality requirements:

- *if an architect builds a house and one of the walls falls, this architect will consolidate this wall at his own expense*
- *if an architect builds a house and the house collapses and the master of the house is killed, that architect is liable to death*

Of course, at that time, customs were very strict. Now by making poor quality, we risk much less, but in the face of global competition to stay on the market and win new customers, we must necessarily make efforts to improve constantly and seek excellence.

The Kaizen approach is a universal solution to achieve this objective. Its origins and development took place in Japan after the end of the Second World War. This is one of the keys to the success of Japanese competitiveness, because everyone has understood that mastering quality pays off.

In the 1950s, the Americans Edwards Deming and Joseph Juran largely contributed to the dissemination and use of statistical quality control methods in Japan. They themselves were inspired by Walter Shewhart's theory of knowledge and management in industrial manufacturing. In his work from 1925 to 1956 at Bell Laboratories, Shewhart implemented control charts with common causes and special causes, the PDCA cycle and other statistical methods of quality assurance.

One of the founders of the Kaizen approach is Taiichi Ohno, author of the TPS (Toyota Production System), the JIT (Just In Time) and other waste-hunting tools.

Another pillar of quality management theory (and practice) is Kaoru Ishikawa. He is the author of the cause-and-effect diagram (fishbone diagram), he successfully developed quality circles, TQC (Total Quality Control), education on a very large scale to apply quality everywhere and by everyone in the company.

The man who made known and adapted the word and the Kaizen approach throughout the world is Masaaki Imai, a consultant and adviser since the 1960s. In 1986, he founded the Kaizen Institute, which now has subsidiaries on all continents, to disseminate the Kaizen concept, philosophy and strategy. His books are bestsellers and have been translated into over 14 languages.

The challenge won by the majority of Japanese managers during the second half of the 20th century originated from the meticulous application of continual improvement based on a few rules and concepts (see also the 10 commandments, [annex 01](#)):

- involvement of all staff:
 - education and training for all
 - top management-supported suggestion system
- the 5 S daily method (improvement starts with oneself)
- tracking down all possible waste in all departments
- the process approach before the results

- quality control and not quality inspection (inspection does not lead to quality)
- top management is responsible for quality, not the staff
- quality control is everyone's business
- not being afraid of problems, because every problem is an opportunity for improvement (there is no improvement where there are no problems)
 - use quality tools on a daily basis (Pareto, Ishikawa, Poka-Yoké, control charts, 5 W, etc.)
- standardize results to eradicate known problems (there is no improvement where there are no standards)
- promote common sense, not expense
- just in time versus just in case
- suppliers (internal and external) are our partners and not our enemies
- find the conditions for the fulfillment of staff at work
- maintain discipline by all

1.2 Benefits

The benefits of applying the Kaizen approach are multiple:

- improved process performance and product quality
- better efficiency
- reduced costs
- shortened deadlines
- low improvement costs
- work is easier
- safety is enhanced
- the suggestions are many and diverse
- communication is real and transparent in both directions
- staff take pride in their work
- and, of course, the most important customers are more satisfied

2 Definitions and books

2.1 Definitions

The beginning of wisdom is the definition of terms. Socrates

5 M: *Mother nature, Material, Method, Manpower, Machine (Fishbone or Ishikawa diagram)*

5 S: *from Japanese Seiri = sort, Seiton = set in order, Seiso = shine, Seiketsu = standardize and Shitsuke = sustain)*

5 W: *five times Why?*

Conformity: *fulfillment of a specified requirement*

Customer satisfaction: *the top priority objective of every management system*

Customer: *the one who receives a product*

Dysfunction: *deviation in the ability of a functional unit to perform a specified function*

Effectiveness: *capacity to perform planned activities with minimum effort*

Efficiency: *financial relationship between achieved results and resources used*

Gemba: *from Japanese, real place, in the field*

Indicator: *value of a parameter, associated with an objective, allowing the objective measure of its effectiveness*

Interested party: *person, group or organization affected by the impacts from a company*

ISO: *International Organization for Standardization*

Kaizen: *from Japanese, kai = change and zen = good (for the better, better), Kaizen = continual improvement*

Management system: *set of processes allowing objectives to be achieved*

Muda: *from Japanese, waste*

Mura: *from Japanese, irregularity*

Muri: *from Japanese, difficulty*

Nonconformity: *non-fulfillment of a specified requirement*

Organization: *a structure that satisfies a need*

Poka-Yoké: *system allowing the prevention of errors by eliminating the human factor (fail safe device)*

Problem: *gap that must be reduced to obtain a result*

Process: *activities that transform input into output*

Product (or service): *any result of a process or activity*

QCD: *Quality, Cost, Delay*

Quality management: *activities allowing the control of an organization with regard to quality*

Quality: *ability to meet requirements*

Requirement: *implicit or explicit need or expectation*

Safety: *absence of unacceptable risk*

SMED: *Single Minute Exchange of Die*

SPC: *Statistical Process Control*

Supplier: *the one who procures a product*

Top management: *group or persons in charge of the organizational control at the highest level*

TQC: *Total Quality Control*

Waste: *anything that adds cost but no value*

WWWVHHW: *Who, What, Where, When, How, How much, Why*

In the terminology of quality management systems, do not confuse:

- anomaly, defect, dysfunction, failure, nonconformity, reject and waste:
 - an anomaly is a deviation from what is expected
 - a defect is the non-fulfillment of a requirement related to an intended use
 - a dysfunction is a degraded function that can lead to a failure
 - a failure is when a function has become unfit

- nonconformity is the non-fulfillment of a requirement in production
- a reject is a nonconforming product that will be destroyed
- waste is when there are added costs but no value
- control and optimize
 - to control is to meet the objectives
 - to optimize is to search for the best possible results
- customer, external provider and subcontractor
 - a customer receives a product
 - an external provider provides a product on which specific work is done
 - a subcontractor provides a service or product on which specific work is done
- effectiveness and efficiency
 - effectiveness is the level of achievement of planned results
 - efficiency is the ratio between results and resources
- objective and indicator
 - an objective is a sought after commitment
 - an indicator is the information on the difference between the pre-set objective and the achieved result
- process, procedure, product, activity and task
 - a process is how we satisfy the customer using people to achieve the objectives
 - a procedure is the description of how we should conform to the rules
 - a product is the result of a process
 - an activity is a set of tasks
 - a task is a sequence of simple operations

Remark: the customer can also be the user, the beneficiary, the trigger, the ordering party or the consumer.

For other definitions, comments, explanations and interpretations that you don't find in this module and in [annex 06](#), you can consult:  




- ISO [Online Browsing platform](#) (OBP)
- IEC [Electropedia](#)


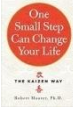
2.2 Books

When I think of all the books still left for me to read, I am certain of further happiness. Jules Renard



Books for further reading on Kaizen approach:

-  Walter Shewhart, [Economic Control of Quality of Manufactured Products](#), ASQC, 1931
-  Walter Shewhart, [Statistical Method from the Viewpoint of Quality Control](#), Dover, 1939
-  Kaoru Ishikawa, [Guide to quality control](#), APO, 1971

-  Philip B. Crosby, [Quality is free](#), Mentor, 1979
-  Kaoru Ishikawa, [What Is Total Quality Control?, The Japanese Way](#), Prentice Hall, 1981
-  Edwards Deming, [Out of the crisis](#), MIT Press, 1982
-  Masaaki Imai, [KAIZEN, The key to Japan's competitive success](#), McGraw Hill, 1986
-  Taiichi Ohno, [Toyota Production System : Beyond Large-Scale Production](#), 1988, Productivity Press
-  Edwards Deming, [The New Economics](#), MIT Press, 1993
-  Masaaki Imai, [GEMBA KAIZEN, A Commonsense Low-Cost Approach to management](#), McGraw Hill, 1997
-  Robert Maurer, [One Small Step Can Change Your Life: The Kaizen Way](#), Algonquin Books, 2014
-  Sarah Harvey, [Kaizen: The Japanese Method for Transforming Habits](#), One Small Step at a Time, Bluebird, 2019


Do not forget the ISO standards dealing with quality management systems in which we find a lot of Kaizen ideas (cf. [annex 02](#)).

3 Process approach

If you cannot describe what you are doing as a process, you do not know what you're doing. Edwards Deming

3.1 Process

The word process comes from the Latin root *procedere* = go, development, progress (*Pro* = forward, *cedere* = go). Each process transforms inputs into outputs, creating added value and potential nuisances.


A process has three basic elements: inputs, activities and outputs. 

A process can be very complex (launch a rocket) or relatively simple (audit a product). A process is:


- repeatable
- foreseeable
- measurable
- definable
- dependent on its context
- responsible for its external providers

A process is, among other things, determined by its:

- title and type
- purpose (why?)
- beneficiary (for whom?)
- scope and activities
- initiators
- documented information
- inputs
- outputs (intentional and not intentional)
- restraints
- people
- material resources
- objectives and indicators
- person in charge (owner) and actors (participants)
- means of inspection (monitoring, measurement)
- mapping
- interaction with other processes
- risks and potential deviations
- opportunities for continual improvement

A process review is conducted periodically by the process owner (cf. [annex 03](#)). 

Review: *a survey of a file, product or process so as to verify if pre-set objectives are achieved*

The components of a process are shown in figure 3-1: 

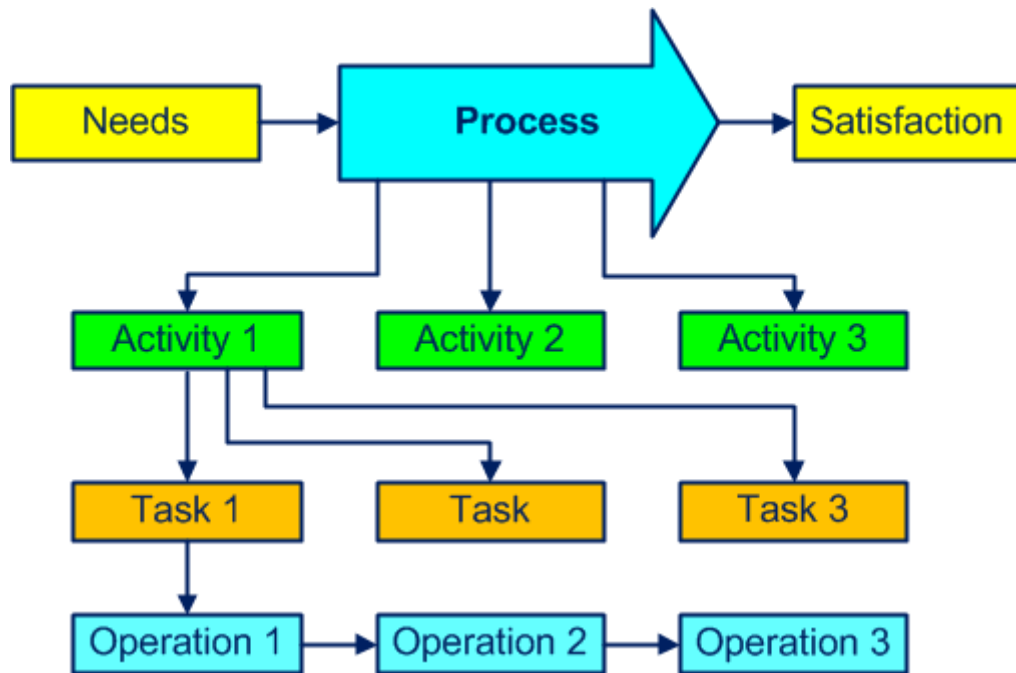


Figure 3-1. Components of a process

Figure 3-2 shows an example that helps to answer some questions:

- which materials, which documents, which tooling? (inputs)
- which title, what objective, which activities, requirements, constraints? (process)
- which products, which documents? (outputs)
- how, which inspections? (methods)
- what is the level of performance? (indicators)
- who, with what competence? (people)
- with what, which machines, which equipment? (material resources)

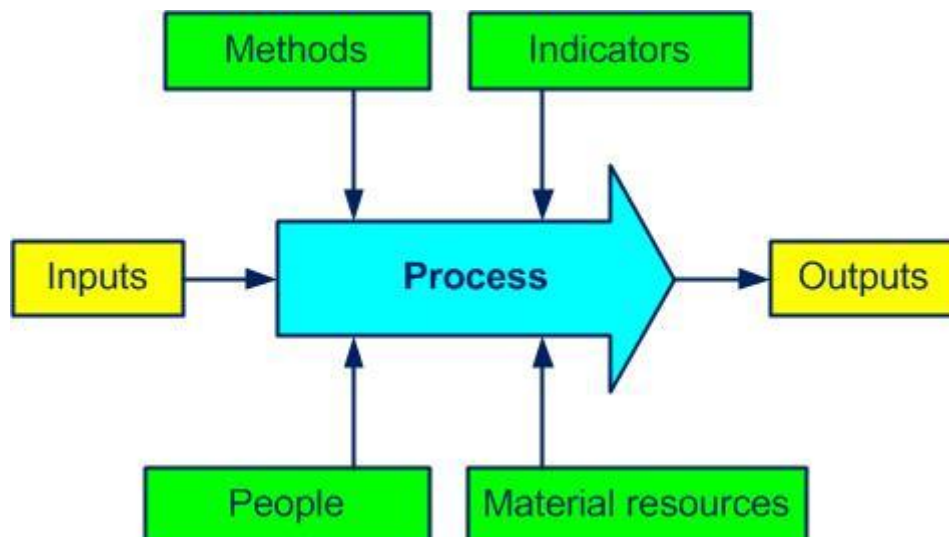



Figure 3-2. Some elements of a process

Often the output of a process is the input of the next process.


You can find some examples of process sheets in the document pack [D_02](#) and a list of processes in [annex 04](#). 

Any organization (company) can be considered as a macro process, with its purpose, its inputs (customer needs and expectations) and its outputs (products/services to meet customer requirements).

Our preference is to identify a process using a verb (buy, produce, sell) instead of a noun (purchases, production, sales) to differentiate the process from the company's department or documented information to maintain and recall the purpose of the process.

The processes are (as we shall see in the following paragraphs) of management, realization and support types. Do not attach too much importance to process categorizing (sometimes it's very relative) but ensure that all the company's activities at least fall into one process.


3.1.1 Management processes

Management processes are also known as piloting, decision, key or major processes. They take part in the overall organization and include elaboration of the policy, deployment of the objectives and all needed checks. They are the glue holding together all of the realization and support processes. 

The following processes can be part of this family:

- develop strategy
- address risks
- develop policy
- deploy objectives
- establish process ownership
- improve
- conduct an audit
- communicate
- plan the QMS
- acquire and manage resources
- conduct management review
- measure customer satisfaction
- negotiate contract
- analyze data

3.1.2 Realization processes

The realization (operational) processes are related to the product, increase the added value and contribute directly to customer satisfaction. 


They are mainly:

- design and develop
- purchase components
- sell products
- produce
- inspect production
- maintain equipment
- implement traceability
- receive, store and deliver
- control nonconformities

- implement preventive and corrective actions

3.1.3 Support processes

The support processes provide the resources necessary for the proper functioning of all other processes. They are not directly related to a contribution of the product's added value but are

still essential. 

The support processes are often:

- control documentation
- provide information
- maintain infrastructure
- provide training
- manage inspection means
- keep accountability
- manage staff

3.2 Process mapping

Par excellence process “mapping” is a multidisciplinary work. This is not a formal requirement of either ISO 9001 or other ISO standards but is always welcome.

The three types of processes and some interactions are shown in figure 3-3.

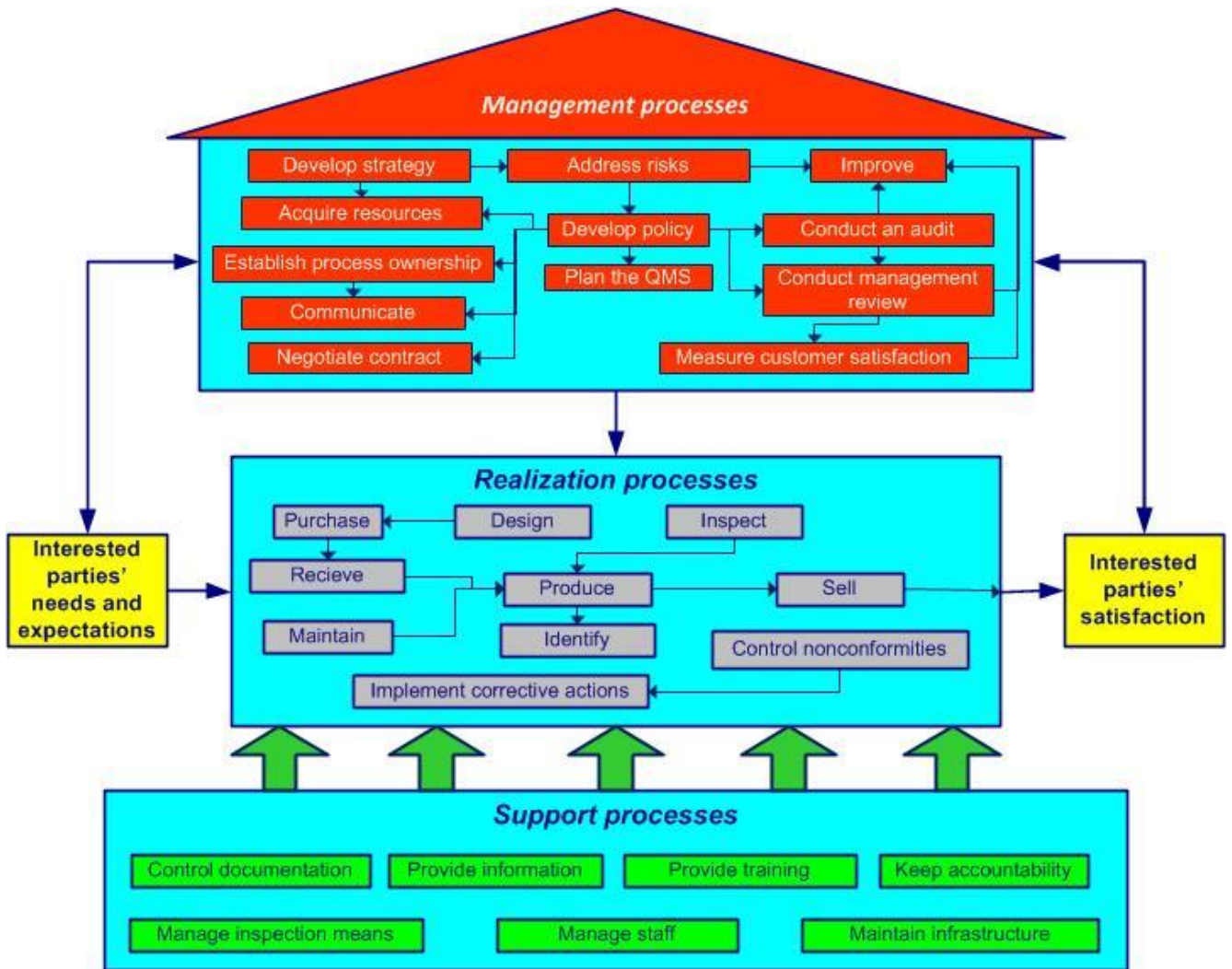


Figure 3-3. The process house

In the outputs, do not underestimate unwanted products such as rubbish, pollution and rejects.

Mapping, among other things, allows you to:

- obtain a global vision of the company
- identify the beneficiaries (customers), flows and interactions
- define rules (simple) for communication between processes

To obtain a clearer picture, you can simplify by using a total of about 15 core processes. A core process can contain several sub-processes: for example, the process “develop the QMS”

can involve: 

- develop strategy
- develop policy
- address risks
- plan the QMS
- acquire resources
- establish process ownership
- improve

Two other process examples (“design”, figure 3-4 and “produce”, figure 3-5) are:



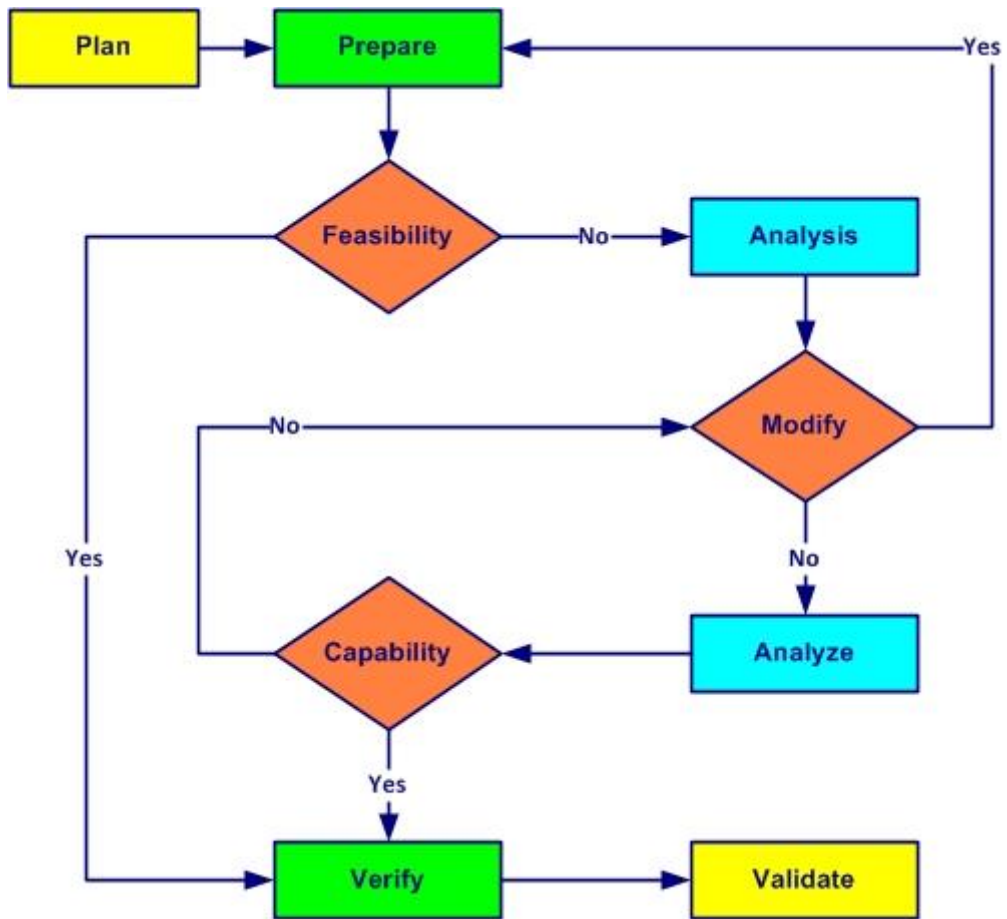


Figure 3-4. Design process

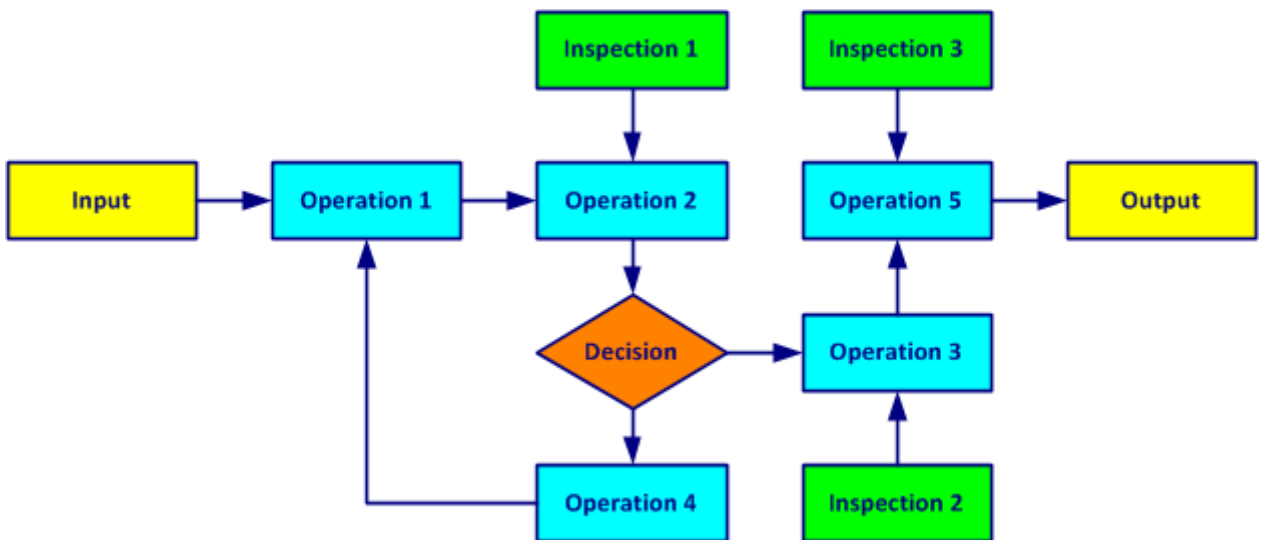



Figure 3-5. Produce process

3.3 Process approach

Simple solutions for now, perfection for later

The process approach contributes enormously to the efficient management of the company (cf. [annex 07](#)). Some benefits: 

- obtain a global vision of the company
- identify and manage responsibilities and resources
- achieve effective management of the company based on process indicators
- manage the risks that could influence the objectives (cf. [annex 05](#))

Process approach: *management by the processes to better satisfy customers, improve the effectiveness of all processes and increase global efficiency*

When the process approach is integrated during the development, implementation and continual improvement of a quality management system, it allows one to achieve objectives that are related to customer satisfaction, as is shown in figure 3-6.

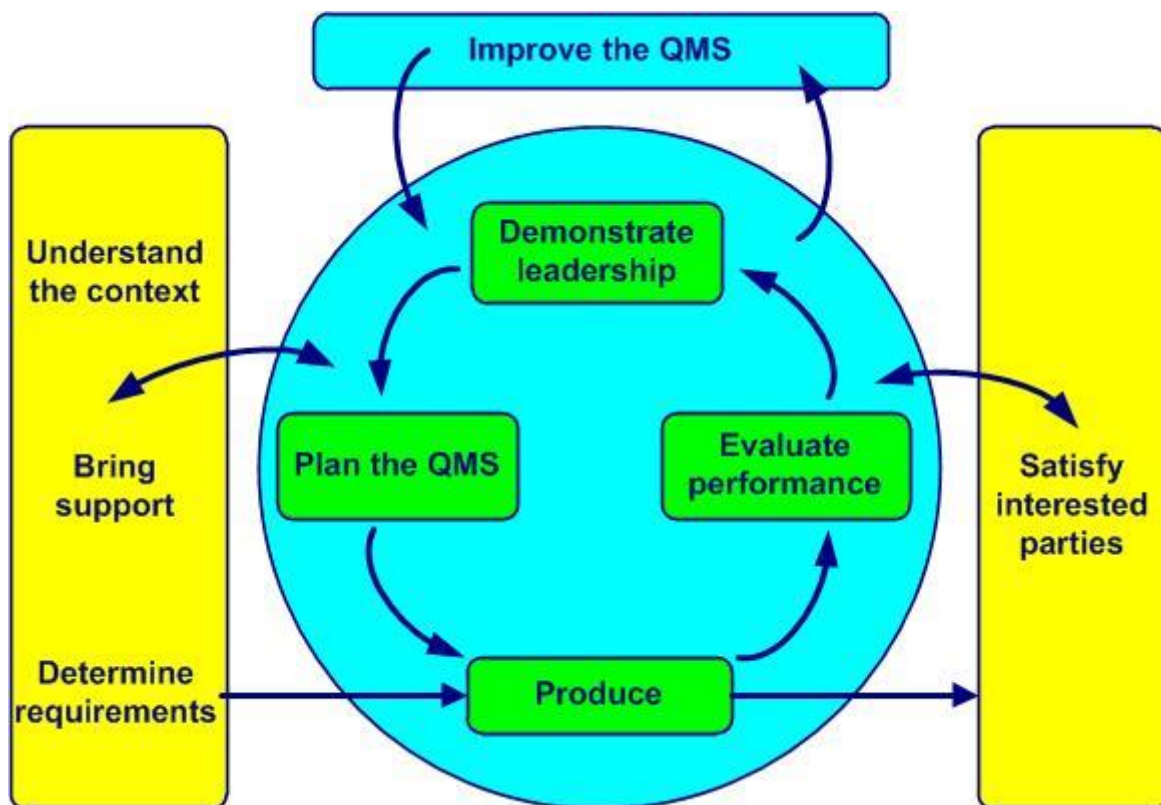


Figure 3-6. Model of a QMS based on the process approach and continual improvement

The process approach:

- emphasizes the importance of:
 - understanding and complying with customer requirements
 - prevention so as to react to unwanted elements such as:
 - customer returns
 - waste
 - measuring process performance, effectiveness and efficiency
 - permanently improving objectives based on pertinent measurements
 - process added value
- relies on:
 - methodical identification
 - interactions
 - the sequence and
 - process management, which consists of:
 - determining objectives and their indicators

- piloting related activities
- analyzing obtained results
- permanently undertaking improvements
- allows one to:
 - better view inputs and outputs and their relationship
 - clarify roles and responsibilities
 - judiciously assign necessary resources
 - break down barriers between departments
 - decrease costs, delays and waste
- and ensures in the long run:
 - control
 - monitoring and
 - continual improvement of processes

The process approach **is not**:

- crisis management (“You will not solve the problems by addressing the effects”)
- blaming people (“Poor quality is the result of poor management.” Masaaki Imai)
- prioritizing investments (“Use your brain, not your money.” Taiichi Ohno)



4 Principles and concepts

4.1 Principles

The Kaizen principles are:

- 5 S:
 - improve working conditions
 - better organize
 - less tired
 - more safety
- eliminate waste:
 - fewer errors (Poka-Yoké)
 - quick tool change (SMED)
 - less fatigue
 - fewer accidents
- standardize:
 - really necessary documents
 - clear and simple text
 - risk prevention (see [annex 08](#))

For these principles to be successfully applied, top management has become aware that:

- staff are the company's most valuable asset and participate in the improvement of all processes
- improvements are made step by step (gradually) in a short time
- each problem can become an opportunity for improvement and not the search for the culprit and their punishment
- working in a multidisciplinary team to solve problems is the rule
- tackling preconceived ideas is not a taboo (example: high quality leads to high costs)
- the question we ask ourselves every day is: how can we improve our performance?

4.2 Concepts

The concepts involved in the Kaizen approach include the following ideas.

4.2.1 PDCA cycle

The Deming cycle (figure 4-1) applies to the control of any process. PDCA cycles (Plan, Do, Check, Act) are a universal basis for continual improvement.

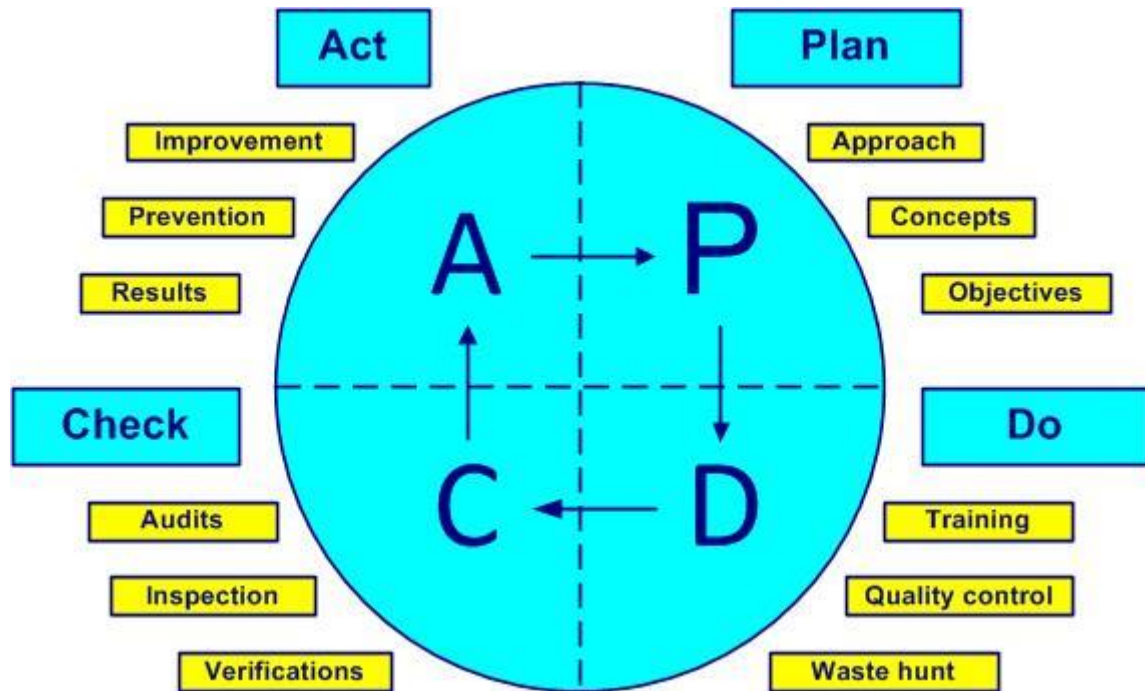


Figure 4-1. The Deming cycle

- Plan – define and establish the approach, the concepts, the customers, the processes, the objectives, identify problems
- Do – implement training, control the quality, hunt waste, solve problems
- Check – inspect, analyze, conduct audits, check whether objectives are achieved
- Act - adjust, adapt, improve, react with preventive actions, communicate results, find new improvements (new PDCA)

4.2.2 Next step

Everyone must realize that customers are a fraction of the stakeholders:

- customers
- staff
- environment
- shareholders
- suppliers

Never forget that the downstream process is your customer because every process has its supplier and its customer. Ensuring quality is:

- not receiving non-conforming products
- not producing non-conforming products and
- not sending non-conforming products

4.2.3 Quality before results

Quality approach takes priority over results. Ensure the necessary time and resources to integrate quality from product design stage. High quality and low costs are not mutually exclusive.

4.2.4 Customer focus

Love your customers more than your products

To guess and understand the requirements and expectations of the customers (internal and external) and to satisfy them from the point of view of quality, costs and deadlines. To do this, you must become and remain the best in your field and offer your customers services that are even better than their expectations without "over-quality".

The only measure of quality is customer satisfaction

4.2.5 Upstream management

As shown in Figure 4-2, the costs of failures increase on a logarithmic scale in relation to the stage of their discovery. Controlling costs means anticipating problems (managing upstream).

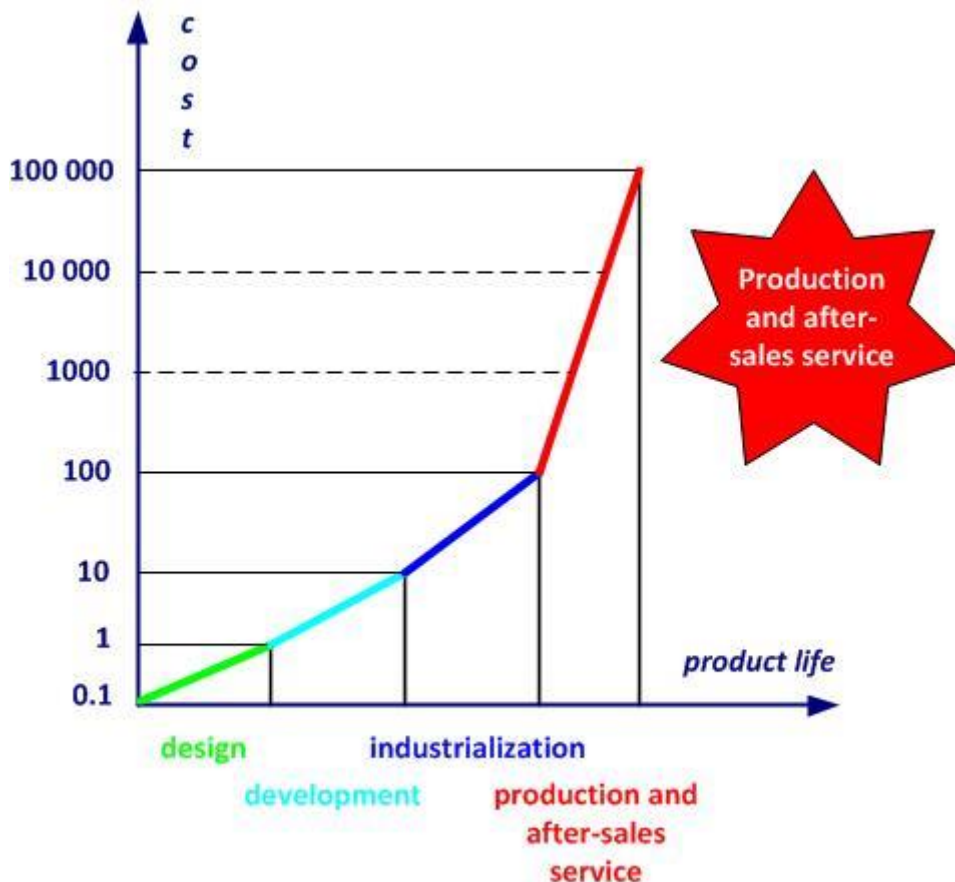


Figure 4-2. The cost of failures versus the life of the product

4.2.6 Rely on data

Forget about intuitions, feelings and impressions. The factual approach means receiving, using and analyzing data objectively, making decisions based on figures. Always doubt the accuracy of the information received and its timeliness.



Minute of relaxation. Cf. joke "[The right place](#)"

4.2.7 Control variability

The best way to get rid of a problem is to solve it

Ask yourself five times the question "Why?" (5 W method), so you can find the root cause of the problem. Operators trained in variability become quality inspectors. This method makes it possible to prevent recurrences. The operators are the most informed of the problems and are the first to realize and react to them.

4.2.8 Education

Practice allows you to consolidate what you have learned in the field. A Chinese proverb says:

Tell me and I'll remember it for an hour. Show me and I'll remember it for a day. Let me do it and I'll remember it forever