MODULE 3
Overview of the principal Management Systems, historical path

Suggested literature:

Chiarini, A. (2013). *Lean Organization: from the Tools of the Toyota Production System to Lean Office*. Springer

Chiarini, A. (2011). *Japanese total quality control, TQM, Deming's system of profound knowledge, BPR, Lean and Six Sigma: Comparison and discussion*. International Journal of Lean Six Sigma, 2(4), 332-355.

What we have seen so far…

We have analysed Operations Management in particular:

- ✓ Product and Process Design
- ✓ Supply Chain Management (Supply Chain as a whole and internal supply chain)
- ✓ Logistics
- ✓ Warehousing and Inventory Control/Management

Now we will study Operations from a Manufacturing point of view. We will focus on **Management Systems,** trying to understand how to improve operations performances

EFFECTIVENESS vs EFFICIENCY

In order to better understand what we are going to study, we have to focus on two simple principles linked to performance.

Effectiveness: how much our targets and goals have been reached

Efficiency: how many resources and how much of them we have used for reaching the targets

EFFECTIVENESS – EFFICIENCY AND THE MOST IMPORTANT MANAGEMENT SYSTEMS WHICH AFFECT PRODUCTION MANAGEMENT, THE SUPPLY CHAIN AND THE COMPANY AS A WHOLE

LEAN MANUFACTURING
Efficiency and effectiveness – shareholder, customer and employee satisfaction

TOTAL QUALITY MANAGEMENT
Efficiency and effectiveness – shareholder, customer and employee satisfaction

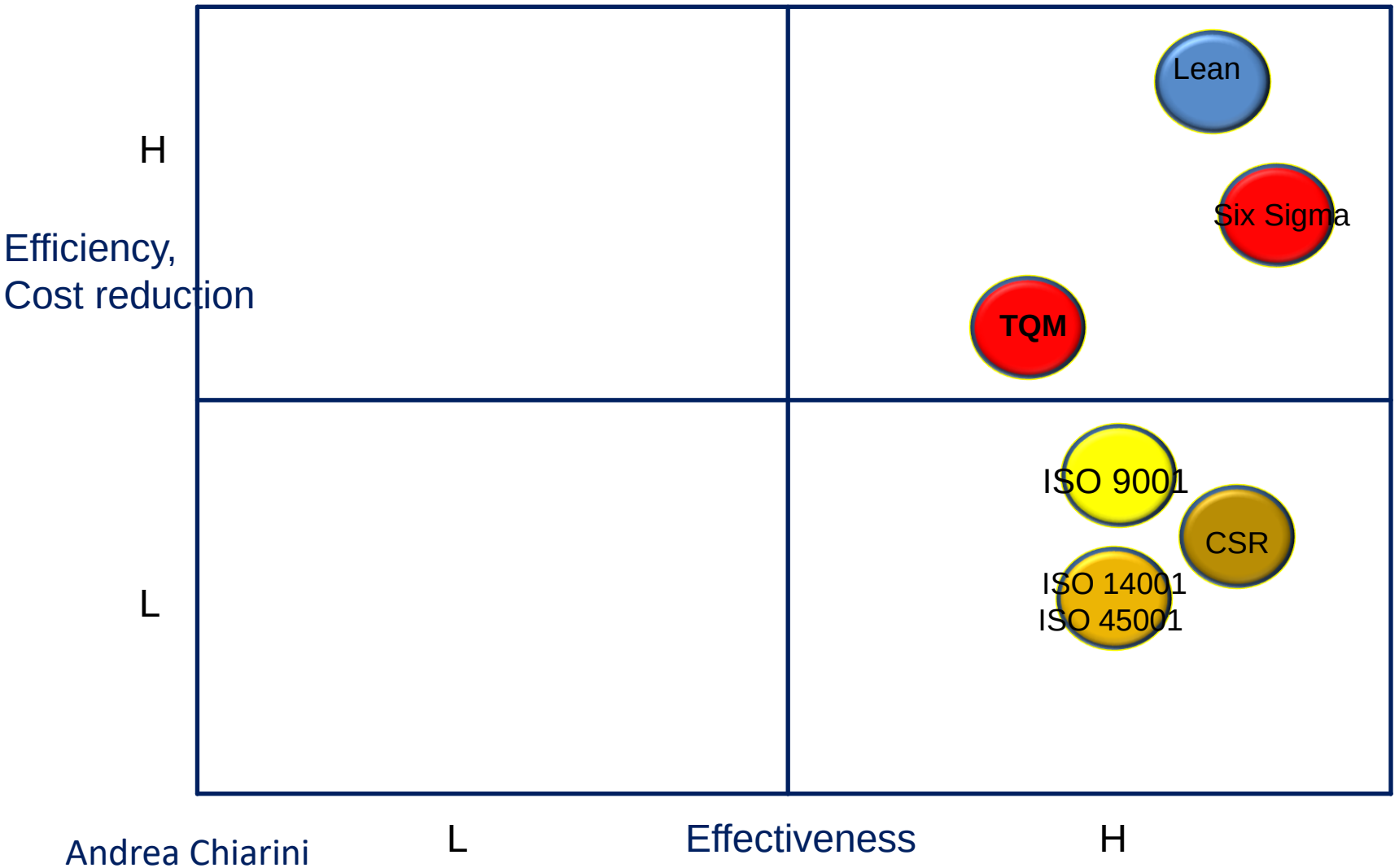
SIX SIGMA
Efficiency and effectiveness – shareholder and customer satisfaction

ISO 9001 'Quality Management System'
Mainly for the effectiveness - customer satisfaction first of all

ISO 14001 'Environmental Management System'
Effectiveness (mainly) and efficiency (secondly) - community, employee and union satisfaction

ISO 45001 'Occupational Health and Safety Management System'
Effectiveness – employee and union satisfaction

CLASSIFICATION OF THE MANAGEMENT SYSTEMS



THE HISTORY OF MANAGEMENT SYSTEMS, FROM MASS PRODUCTION TO LEAN - TQM

THE MASS PRODUCTION ERA

The symbol of Mass Production was FORD

- In 1910s - 1920s Henry Ford coined the term '**Mass Production**' as a production of huge quantities of similar products needed by the market (for instance, the famous Ford 'T-model' reached 2 million units sold in 1925). The main characteristics of Mass Production are:

  - ✓ Products manufactured in large quantities and not customised
  - ✓ Quality not so important
  - ✓ Productivity at its maximum

- Mass Production is mainly focused on a continuous increase of productivity. This leads to unit cost reduction
- Henry Ford used to say:

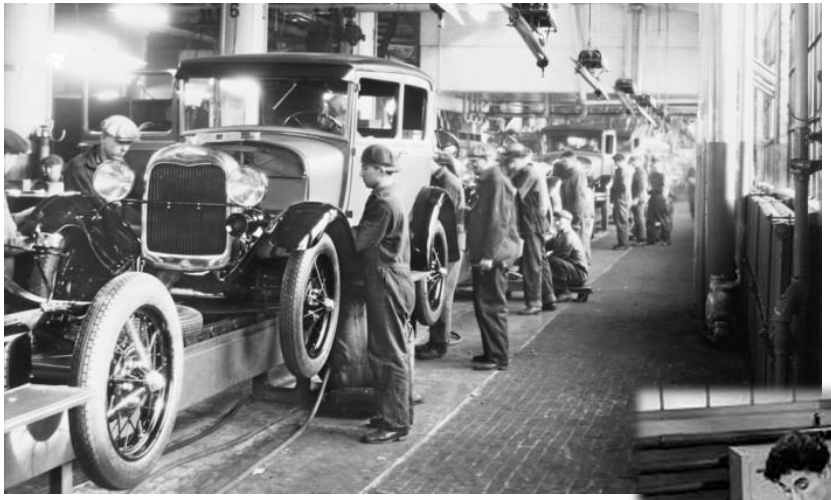
it will be so low in price

that no man making a good salary will be unable to own one (Henry Ford)

MASS PRODUCTION AND FINAL INSPECTION

MASS PRODUCTION - QUALITY AS FINAL INSPECTION – THE EXTREME SPECIALISATION

- *You produce, I inspect*. The Scientific Management by F. Taylor put forward a complete specialisation of the different jobs. Those who were dedicated to the assembly line just had to assemble pieces, following a quicker and quicker rhythm. The market was expecting high quantity of products. Quality was not that important

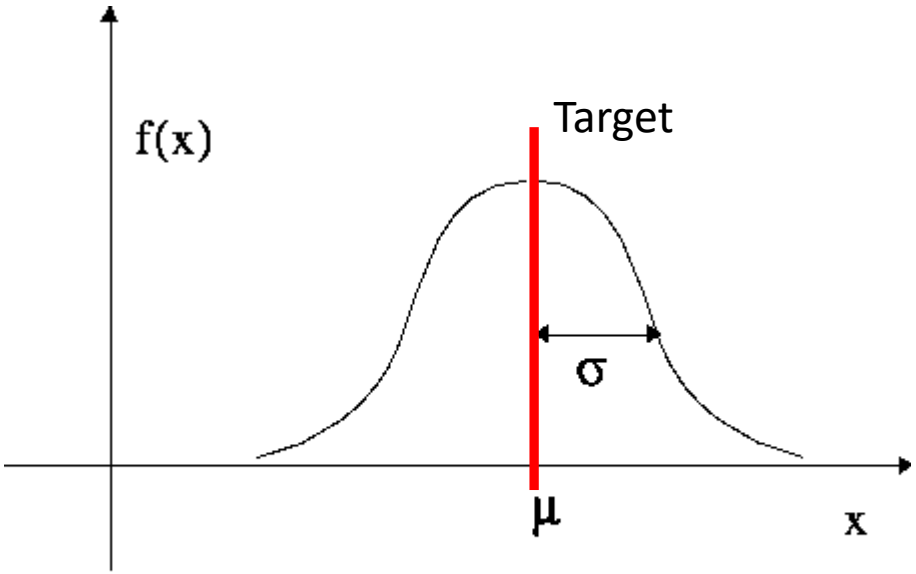


QUALITY CONTROL ARISES

- In 1939 the American Walter Andrew Shewart first argued that quality is not a matter of final inspection in his famous book 'Statistical method from the viewpoint of QUALITY CONTROL'

- Quality control is '**DO IT RIGHT THE FIRST TIME'** reducing in this way VARIABILITY inside the process

- At that time QUALITY CONTROL was just implemented in aerospace, defence and nuclear industry



THE HISTORICAL PATH – JAPAN TRYING TO CATCH THE US

1950's - 1970's, THE MACROECONOMIC SCENARIO

- **US AND EUROPE**:
- Plenty of raw materials and resources such as oil, iron, carbon (energy) at a very low price
- Workers as a real variable cost (US)
- Very high demand of products/services to fulfil

MASS PRODUCTION

- **JAPAN:**
- Raw materials only by import
- Very strong unions. Quite impossible to fire people
- Internal poor market. Economic and financial crisis of the bank system

ENVIOUS OF MASS PRODUCTION !!

BIRTH OF THE TOYOTA PRODUCTION SYSTEM (TPS)

- Sakichi Toyoda established Toyota in 1918

- In 1950, the young entrepreneur Eiji Toyoda went to the American FORD plants in order to learn how to implement Mass Production in Toyota. He was accompanied by his Production manager, Mr Taiichi Ohno

- For a while Toyota produced lorries for FORD using the Mass Production principles

- However, Ohno soon realised Mass Production was not implementable in Toyota and generally in Japanese companies

- Ohno noticed how Mass Production:
  - Produces big lots (big inventories) which cut down working-capital and take up room
  - Is not so mindful of quality (non-conforming products are tolerated)
  - Is not focused on product customisation

BIRTH OF THE TOYOTA PRODUCTION SYSTEM (TPS)

- Taiichi Ohno in 1960's theorised the **SEVEN WASTES AND HOW TO CREATE VALUE ADDED** in the production flow

- During the 1960's Toyota developed tools such as the **KANBAN** card for reducing Work-In-Process inventories **(WIP)** and levelling the production

- Shigeo Shingo was taken on as a production consultant in Toyota for reducing set-up times for presses. He invented the **Single-Minute-Exchange of Die (SMED)** technique

- In 1965 Toyota officially presented its production system to the suppliers. Under these circumstances Toyota introduced the kanban system to the suppliers trying to reduce incoming inventories. The principle of **JUST-IN-TIME (JIT)** was revealed

- In the 1960's the Japanese car manufacturers had an annual production equivalent to 3 days of the annual US car manufacturers

TOYOTA PRODUCTION SYSTEM (TPS) – THE SEVEN WASTES

The seven original Ohno's wastes:

- Overproduction
- Inventories
- Transportation
- Overprocessing
- Defectiveness
- Waiting
- Motion

Due to material flow

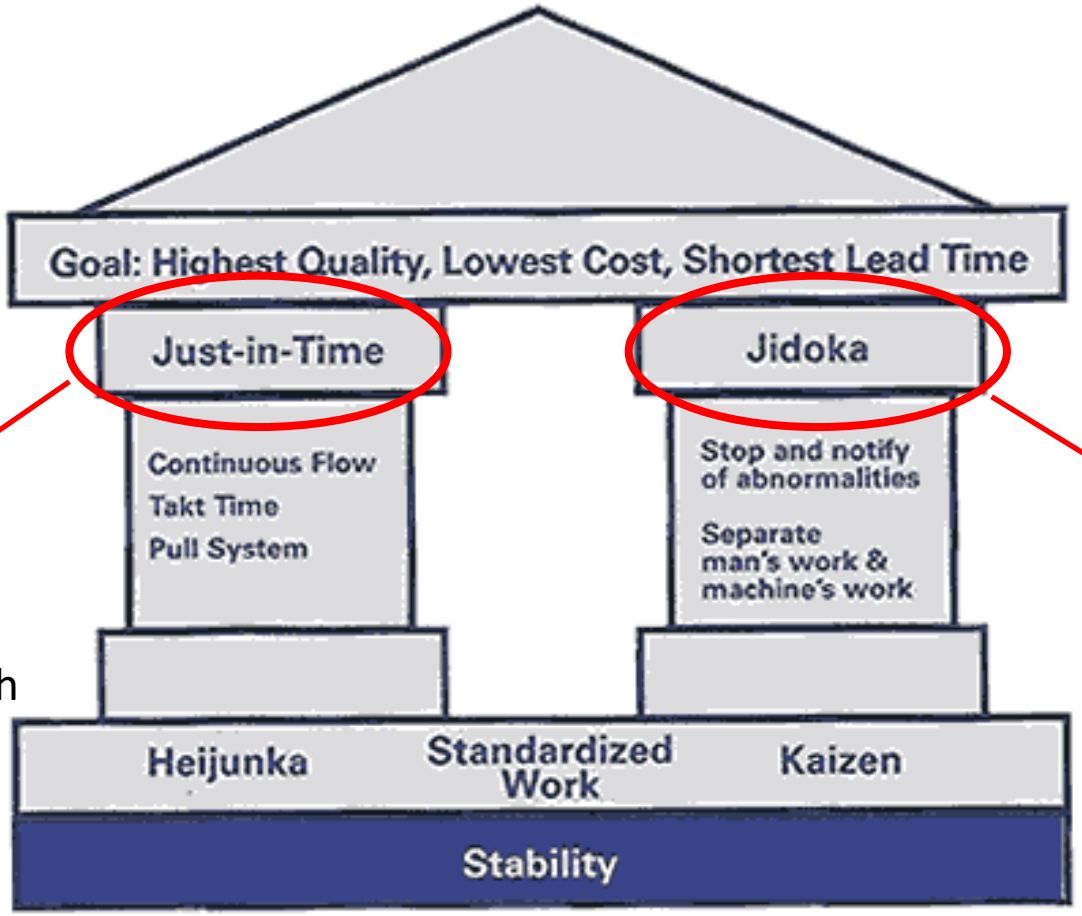
Due to labour

The fundamental Japanese time equation: *the less waste the less lead-time*

US motto: Lean means speed

TOYOTA PRODUCTION SYSTEM (TPS) – THE TWO FUNDAMENTAL PILLARS

Avoiding Overproduction, Levelling your production flow with the **Takt-Time**



Toyota Production System "House"

Self-responsibility
Team-working

TOYOTA PRODUCTION SYSTEM (TPS) – RESPECT FOR PEOPLE

- Respect for people is the attitude that regards people's ability to think most and solve any problem
- People can stop the line or the machine when they find a problem
- Problems have to be solved immediately; the next inspector could be the customer !
- Team-working, Team-building and Team efforts are fundamental for problem-solving

IN THE SAME YEARS TOTAL QUALITY CONTROL WAS BORN…IN THE US

- The American practitioners Feigenbaum, in 1956 published his book 'Total Quality Control'

- According to Feigenbaum TQC is:

An effective system for integrating the quality development, quality maintenance, and quality-improvement efforts of the various groups in an organisation so as to enable production and service at the most economical levels which allow for full customer satisfaction

- Quality Control became 'Total', meaning that quality has to be managed at all levels and functions inside an organisation. Customer satisfaction is the main goal.

TOTAL QUALITY CONTROL

- Due to the emphasised specialisation, Mass Production only fosters inspections carried out by specialised inspectors (I WORK, YOU INSPECT)
- Mass Production is mainly based on **final inspection** and **auditing**
- Total Quality Control introduces the principles of quality for every department (Total), not just for the final inspection
- We have to assure quality (**quality assurance**) to our customers (**customer satisfaction**) in each department

- However, the American TQC once more was based on specialised people and more bound on technical aspects

AMERICAN AND JAPANESE TQC AND TQM

- The American TQC was mainly focused on **QUALITY ASSURANCE** principle, like later the famous ISO 9000 standards. Effectiveness rather than Efficiency

- In the same years the Japanese government took on Deming and Juran for training Japanese managers on quality principles and tools

- Deming and Juran had been working several years with the Japanese Union of Scientists and Engineers (JUSE) launching the so-called **Japanese TQC (JTQC)**

- **JTQC** was based on principles such as **people involvement, empowerment and team efforts** and took on board the Shewart's teaching on process variability

- In 1962 the Japanese Professor Ishikawa invented the **4M theory**, the **cause and effect diagram, the 7 quality tools** and launched the first **quality circles** inside many Japanese companies, including Toyota. Quality circles in Japan were completely based on a voluntary approach

- Due to Deming's principles, especially in Western society, from the 1970's TQC has been often cited as **Total Quality Management (TQM)**

JAPANESE TQC DNA – VERY SIMILAR TO TPS DNA

JTQC has principles such as:

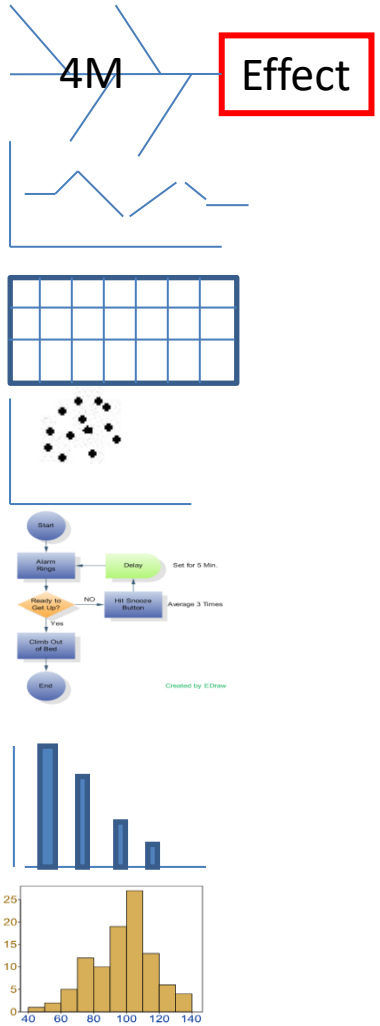
- Respect for people's work, empowerment and involvement of all the staff
- Day-by-day improvements **(Kaizen)**
- cross-functional management
- voluntary teams committed to improvement

Daily management is based on the improvement of best-practice methods and the team operates day by day involving all the levels and employees

Ishikawa considered that TQC was not exclusively a task for quality specialists; people have to receive training and education for the best practices

THE SEVEN (BASIC) QUALITY TOOLS

- Cause and effect diagram
- Control Chart
- Stratification
- Scatter diagram
- Flow-chart
- Pareto analysis
- Frequency histogram



TQM AND PDCA FOR CONTINUOUS IMPROVEMENT
THE ORIGINS OFTHE KAIZEN

Plan: Planning the improvement, making up the team, analysing the causes of the problem

Do: Do something for improving, going to the root-cause, removing the causes

Check: Checking the results of the D stage, being sure of having removed causes

Act: Acting for understanding the previous stages, standardising the results, planning new improvements

PDCA methodology is the foundation of the ISO 9001 standard

JTQC – TQM, THE BASICS

Leadership and customer satisfaction commitment

People involvement and respect

Quality Assurance (Standard Work)

Reducing defectiveness, COPQ (Cost-Of-Poor-Quality)

JAPANESE TQC AND TPS GOT MARRIED

- In the early 1960's JTQC and TPS started merging
- For instance, Japanese quality circles in those years used to apply the 7 basic tools along with Jidoka, Poka-Yoke, SMED, Kanban and 3S
- 3S (Seiri-Seiton-Seiso) was invented in Toyota for setting in order and cleaning workplaces. Later it becomes 4S and then 5S due to the US influence
- Respect for people's work, empowerment and involvement of all the staff were and still are the most important principles inside Japanese organisations
- In the 1970's Western companies such as Lockheed in the US, Rolls-Royce in the UK and FIAT in Italy introduced quality circles…However they did not always succeeded…especially when circles were voluntary…

WIND OF CHANGE – THE 1973 CRISIS

- In the 1973 the Arab-Israeli war sharply increased cost of crude oil per barrel
- The **Fordism** based on the principle of resources at low price faced a first crisis
- Moreover, per capita income had been increasing for many years
- The more you earn, the more quality you want
- Consumers started demanding more quality and customisation on the product/service

The market turned into Japanese's favour, however many Western companies kept on taking mass production for granted !

THE US 1980'S ECONOMIC CRISIS – IT'S HIGH TIME TO LEARN FROM JAPAN !

- Some Western companies started better analysing and implementing TPS
- In 1978 the Ohno's book was translated in English, TPS became definitively a model
- In 1979 the MIT launched a research plan called IMVP (International Motor Vehicle Program). The aim was to study and compare the production systems of the major automotive players, including Toyota. The researchers Jim Womack, Daniel Jones and Dan Roos were involved
- In 1980 Deming was invited at the NBC television for explaining to the Americans what is TQM and why Japanese companies are implementing it. NBC created a documentary called: *if Japan can, why we can't?*
- In 1982-1983 the US went into a relevant economic crisis. Like in 2008, the crisis mainly stemmed from the banking system
- In the meanwhile Japanese began to acquire market shares in many sectors
- Japan bought even part of the American public debt

OUT OF THE CRISIS THROUGH LEAN AND SIX SIGMA

- Japanese industries established transplants in the US and Europe. They demonstrated that TPS can be effectively implemented also outside Japan.

- A still alive debate raised: *Is TPS a matter of cultural principles? Japanese culture Vs Western culture? Buddhism Vs Cartesianism? Or just a matter of management style*

- The Reaganomics pulled out from the shallows the US. The new motto was: *less finance more industry*

- In 1982 Deming wrote the famous book: *Out of the crisis*. Within the book there are 14 commandments against crisis dedicated to the US industry

- In 1988 the US launched the first Malcom Baldridge Award for the more excellent US industries. Reagan awarded the first prize to Motorola. They reduced manufacturing costs by around 1 billion using a new model: the **Six Sigma**

- As a result of the MIT research plan, in 1990 Womack, Jones and Rooss wrote a book as famous as Deming's book: *The machine that changed the world: the **Lean Production** story.* Since then **Lean Production** in the West has been synonym of TPS

OUT OF THE CRISIS – DEMING'S SUGGESTIONS AND EXHORTATION

The 14 Managerial principles

- 1.'Create constancy of purpose towards improvement'. Replace short-term reaction with long-term planning.
- 2.'Adopt the new philosophy (TQM and TPS)'
- 3.'Cease dependence on inspection'
- 4.'Consider total cost, not just initial cost'
- 5.'Improve constantly and forever'
- 6.'Institute training on the job'
- 7.'Institute leadership'
- 8.'Drive out fear'
- 9.'Break down barriers between departments'
- 10.'Eliminate slogans, fixed targets and exhortations for workers (Japanese Kaizen first of all)
- 11.'Eliminate numerical goals for single department/function (MBO)'
- 12.'Remove barriers to be pride of workmanship'
- 13.'Encourage education and self-improvement'
- 14.'Take actions needed to make transformation'

LEAN AND SIX SIGMA - GO WEST

- In 1987, The International Organisation for Standardization (ISO), following the principles of the TQC, in particular the **quality assurance** principles (effectiveness) issued the first edition of the famous ISO 9000 standards. ISO 9001 certification was born
- Starting from the 1980's, customers and citizens have become more interested in environmentsl issues and aware of the so-called CSR

- In 1990 Toyota manufactured half of General Motors' cars

- In 1991 the European Union launched the **EFQM Award**, similar to the American Malcom Baldridge. Both are mainly based on TQM principles and CSR

- During the 1990s Lean Production, Six Sigma and ISO 9001 began the most important management systems in the US and Europe. Many companies embraced new certifications such as ISO 14001 for the environmental management

- Due to Six Sigma, TQM in Western culture has been gradually losing its interest to the companies

- TQM in Western countries is now considered more a philosophy than a management system

SIX SIGMA - GO WEST

- Six Sigma is a trade mark of Motorola developed by the managers Bill Smith during the 1980s and definitely embraced by Motorola's CEO Bob Galvin for Motorola as a whole

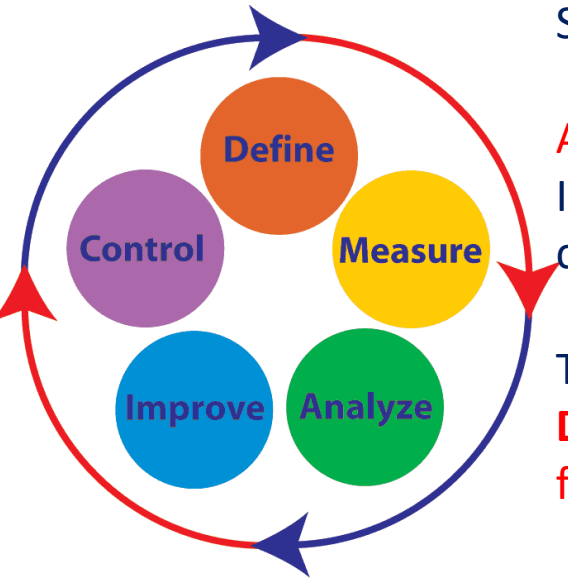
- During the 1990's, the famous General Electric's CEO Jack Welck launched Six Sigma within GE

- The conventional model that we nowadays apply is directly derived from GE's experiences

- Nowadays, many Blue Chip companies and thousands of other companies around the world have been implementing Six Sigma, including 3M, Allied Signal, Boeing, Caterpillar, DuPont, Dow Chemicals, Google, Microsoft, etc.

- NYSE and NASDAQ have shown interest in Six Sigma because it is considered an aggressive way for making savings

WHAT IS SIX SIGMA IN A NUTSHELL



DMAIC

Six Sigma can be surely considered the heir of TQM and TQC

All the tools and techniques invented by TQM, from the 7 basic Ishikawa's tools to the most advanced statistical ones , have been categorised within a PATTERN called DMAIC

The DMAIC pattern is similar to the Deming's PDCA one. However, **DMAIC is more rigorous**, **saving oriented** and usually is managed for complex projects

The main Six Sigma goal is to reduce variability inside processes, as Dr Shewart in 1939 taught….

Reducing variability inside processes, removing all the causes of variability , means reducing defects inside the processes and in the end reducing **Cost of Poor Quality (COPQ) such as customer dissatisfaction, defects, reworking, etc.**

WHAT IS GOING ON WITH TQM?

- We pointed out that TQM has derived from the TQC

- In its DNA we can find principles and tools such as:

  - ✓ Management commitment (Juran and Deming)
  - ✓ Quality assurance (Feigenbaum)
  - ✓ People involvement and empowerment (Deming)
  - ✓ Continuous improvement in reducing COPQ and increasing customer satisfaction
  - ✓ Strategic tools such as Hoshin Kanri
  - ✓ An organisational structure based on processes rather than functions (Deming)
  - ✓ Tools for reducing variability such as PDCA problem solving, the 7 basic tools and other advanced statistical tools

Unfortunately, **TQM DOES NOT HAVE A PRECISE PATTERN FOR IMPLEMENTING IMPROVEMENTS SUCH AS THE SIX SIGMA DMAIC** or the specific tools of the TPS. Furthermore, there are many 'gurus' who have argued about TQM in different ways. Moreover, especially in Europe, the adjective Total has affected many organisational performances such as environment, safety, business ethics, etc

In the West TQM is now considered a philosophy more than a real management system

2018 - OLD WINE IN NEW BOTTLES?

LEAN SIX SIGMA
Combining 'speed' with COPQ reduction

WESTERN INDUSTRIES

TPS (LEAN)
JTQC
Combining 'speed' with COPQ reduction

JAPANESE INDUSTRIES

LEAN SIX SIGMA – THE NEW WESTERN MANAGEMENT SYSTEM

The main aim of Lean Production – TPS is to generate savings reducing **Lead Time**

For speeding up the flow we are supposed to banish the 7 Ohno's wastes

For removing the 7 wastes we have to implement well-coded tools and techniques

For measuring the results we can use KPIs which belong to the so-called Lean Metrics

The main aim of Six Sigma is to generate savings reducing **variability**

For reducing variability we are supposed to remove the 'root-causes'

For removing the root-causes we have to follow the DMAIC path and its tools

For measuring the results we can use KPIs which belong to so-called COPQ

WHAT WE HAVE SEEN SO FAR

- Mass Production was (and in some countries still is) based on high demand of products, very similar to each other (poor customisation) and often with poor quality

- Because of the macroeconomic situation in Japan, Toyota invented a different management system called Toyota Production System where wastes are banished

- TPS has also used JTQC principles and tools. JTQC-TQM is a new way of managing quality where people are fundamental and extreme specialisation is not required

- Since the 1970s, TPS has started bearing fruits, Japanese industry has expanded more and more. People have become richer and richer and they have asked for different kinds of products

- In the 1980's the US faced a terrible economic crisis which stemmed from the banking system. Anyhow, they soon learnt the lesson and the economy picked up. Since then, many companies in the US and Europe have been implementing Lean and TQM. Motorola invented a new management system called Six Sigma

STRATEGIES AND PERFORMANCE MEASUREMENT SYSTEMS

- The 'grand strategy' of Mass Production is *a continuous increase of productivity*, often at the expense of customisation and quality (there is a *trade-off* between productivity, quality and customisation)

- PMS is mainly based on the KPIs:
  - Number of products per period (Effectiveness indicator)
  - Turnover of the period/Costs of the period (Efficiency indicator)

- The 'grand strategy' of Lean-TPS is *a continuous reduction of the lead-time*, and there is no *trade-off* among quality, costs reduction and customisation

- PMS is mainly based on time performance and *the seven wastes*

But what about Six Sigma?

TOYOTA PRODUCTION SYSTEM (TPS) – THE THREE MUs

In Japan waste is often called MUDA and there are three different kind of wastes named 'the three MUs ' :

- ✓ **MUda** = more capacity than workload (real waste)
- ✓ MUra = capacity that swings around the fixed target (the waste is due to a not steady activity/process, there is some variability in the process)
- ✓ MUri = more workload than capacity (workers and machines are too busy)

TOYOTA PRODUCTION SYSTEM (TPS) – THE SEVEN MUDAS

The seven original Ohno's wastes:

- Overproduction
- Inventories
- Transportation
- Overprocessing
- Defectiveness
- Waiting
- Motion

Due to material flow

Due to labour

The fundamental Japanese time equation: *the less waste the less lead-time*

US motto: Lean means speed

THE SEVEN WASTES - OVERPRODUCTION

Overproducing means, quite simply, producing an amount of products that exceeds the demand too soon or too fast. A very simple Ohno's consideration:

Overproducing means producing when there is no customer order

Negative consequences of overproduction:
- Increase in inventories (second waste);
- Production process slowing down;
- Reduction of planning flexibility;
- Increase of indirect cost such as transport, inspections (see other wastes), and so on

The causes for overproduction are often related to:
- Production of oversized 'economic lots';
- Long lead time;
- Low speed of setups;
- Creating inventories to make up for defectiveness;
- Unnecessary staff in a process;
- Too many or too fast machines.

THE SEVEN WASTES - INVENTORIES

Inventory is the typical waste that, in manufacturing, is linked to overproducing.

Inventory is any product or raw material that has been stored within or outside the organisation for a certain period of time

Stock can therefore be made up of raw material, semi-finished products (**WIP**) or finished products

Inventory causes:

- Long changeover times (setups);
- Producing big 'economic' lots (Shish-Kabob);
- Early production;
- Bottlenecks in the production/service implementation flow;
- Parts of the process create defects;
- Processes at the beginning are quicker than those nearer to the end;
- Accepting that excessive inventory cannot be avoided, because it means to immediately deliver to the customers

Excessive inventory hides problems, it does not solve them !!

THE SEVEN WASTES - TRANSPORTATION

Excessive inventories inevitably lead to increased transportation activities

Conveyances or transportations mainly concern logistics activities such as moving products:

- from one warehouse to another one;
- from a warehouse to a production process;
- from a production process to another one;
- from one storage location to another one

Causes:

- Too large lots or too many lots;
- A poor layout design (e.g. job-shop layout);
- Accepting that conveyance/handling is inevitably part of the process

.

THE SEVEN WASTES - OVERPROCESSING

Overprocessing is adding more value to a process/product than the customer actually requires or needs (redundancy); often is too much cycle-time

Examples:

- Painting areas that will never be seen or be exposed to corrosion;
- Double checking a product when not necessary *(I will test the product once more because I am not completely confident of what I have done*)
- Machining products too long when no needed

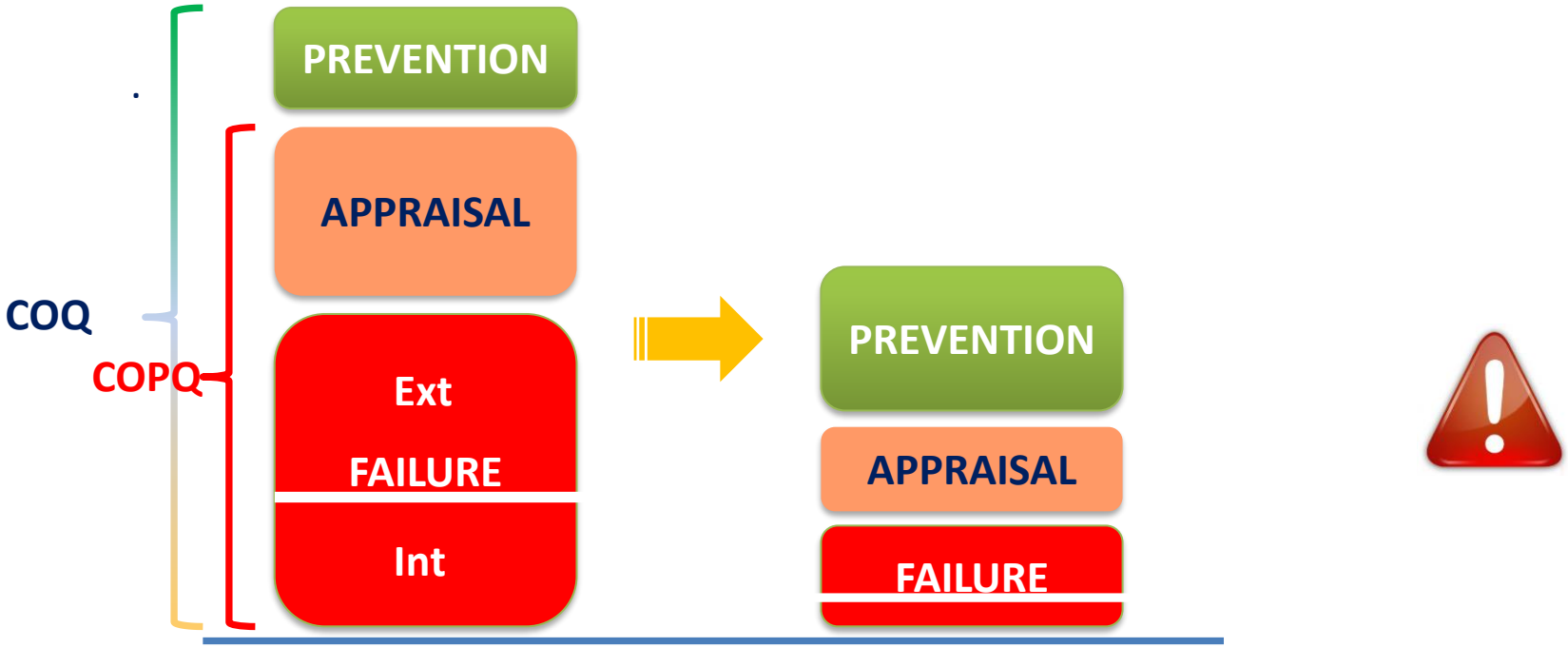
Causes:

- Inadequate process designing;
- Lack of training and skills;
- Inadequate activity analysis;
- Incomplete activity standardisation (e.g. lack of ISO 9001 documentation)
- Inadequate tools, machines and automations;
- Working with inadequate material

THE SEVEN WASTES – DEFECTIVENESS

Waste derived from the TQC-TQM world. There are several costs linked to this waste

TQC theory (Feigenbaum) divides the costs into Cost Of Quality (COQ) and **Cost Of Poor Quality** (COPQ)
COQ are classified using the **Prevention-Appraisal-Failure (PAF)** classification



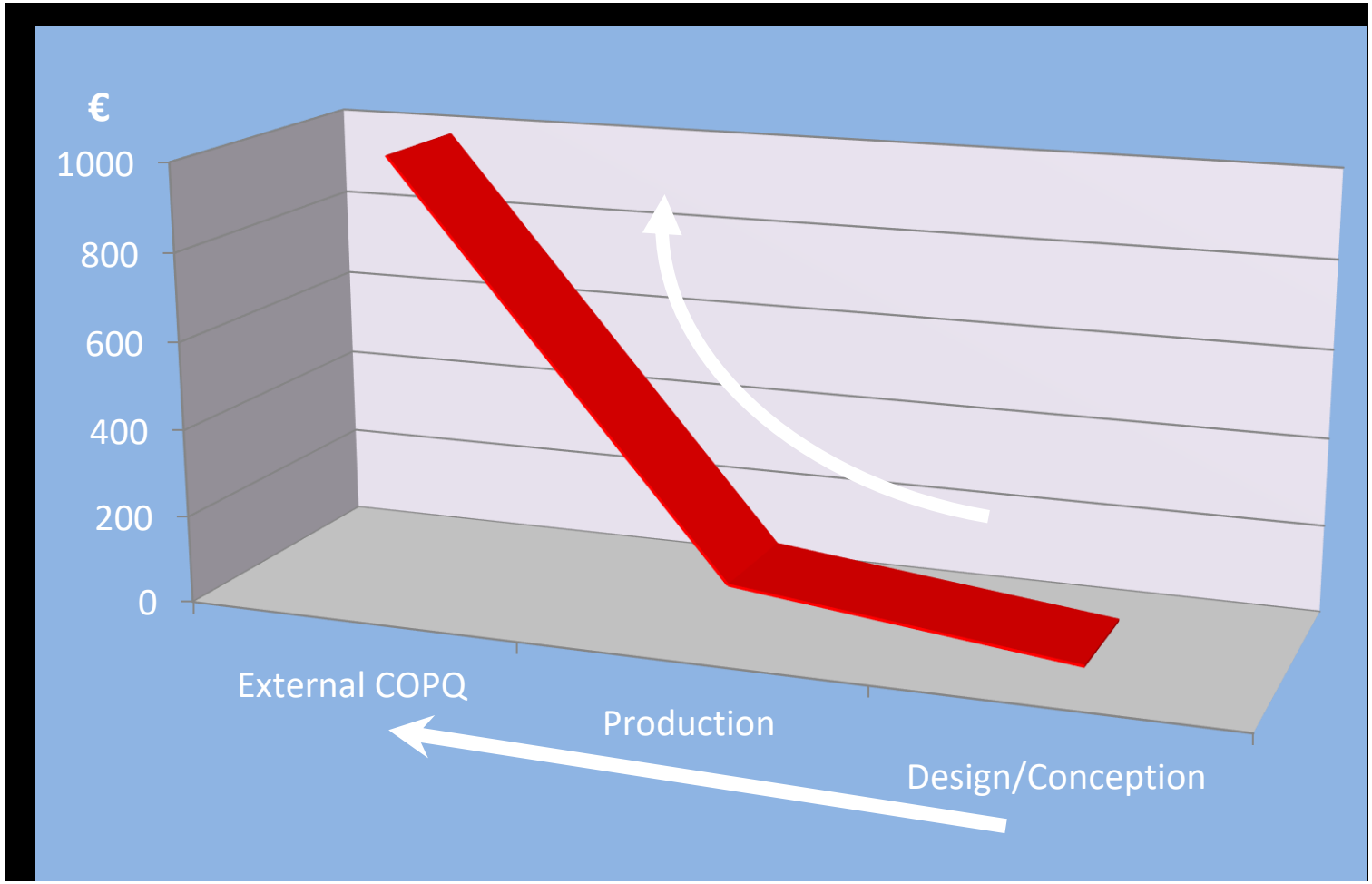
THE SEVEN WASTES – COST OF POOR QUALITY

COPQ derives from the PAF classification and it is used inside JTQC, TQM, Lean and especially Six Sigma. For instance, Six Sigma project savings are usually measured by means of COPQ

Cost Of Poor Quality (COPQ)	Categories
External cost of poor quality	Loss of market share Warranties Penalties
Internal cost of poor quality	Reworks-Redoing Scraps Rejected products Overstuffing/understaffing Billing and accounting errors Unusable products Incorrect offers Incorrect design documentation Shipping damage Injuries
Appraisal	Unnecessary inspections, checks, tests, review meetings, reports

THE RISE OF COST OF POOR QUALITY

COPQ increases almost exponentially from the design processes to the customer



THE SEVEN WASTES – WAITING

Waiting time concerns workers' activities, even when they are performing a machine's operations

Examples:

- Workers stationary at the machines waiting for them to finish an operation
- Staff waiting for the start of a meeting because a document has yet to arrive
- People waiting for machine downtime

Causes:

- Lack of balance between activities;
- Poor preventive maintenance;
- Lack of training;
- Production in big lots;
- Lack of order and cleanliness;
- Lack of procedures and instructions

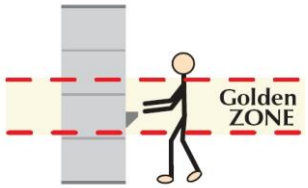
Andrea Chiarini

THE SEVEN WASTES – MOTION

Waste of time due to the movements of workers

Example

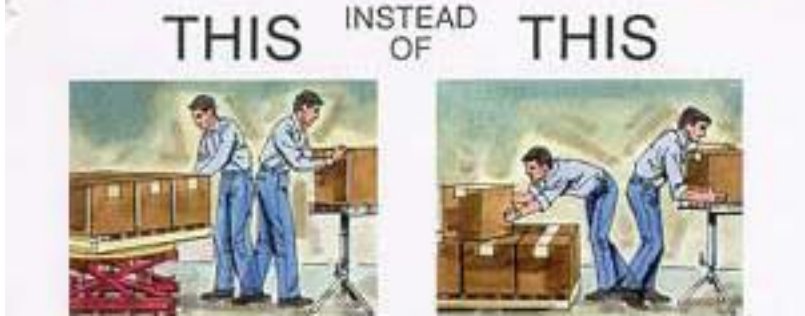
- Workers who walk around the workplace for taking products, tools, documents, etc.
- Workers who waste time for moving their own body
- Etc.



Wrong motions can affect safety and health of workers

Causes

- Poor workplace design;
- Workers with lack of skills and/or poor training;
- Poor staff involvement;
- Increase in staff or work hours;
- Lack of order and cleanliness;
- Activities performed in isolated areas



Andrea Chiarini

WASTE AND VALUE ADDED WORK

The opposite of waste is **VALUE ADDED (VA)** (activity or process)

When does a process/activity create Value Added instead of Waste?

What is Value Added? Let's try to define it ….

Value Added is transformation (production, service realisation, provision, etc.) of an input into an output….

*However, the output must give **customer value** and…*
*it has to be obtained **at the lowest cost***

(Value Added = Maximum Effectiveness and Efficiency)

Taiichi Ohno used to say:

'If you want to know if you are really creating Value Added,
You have to ask yourself,

Am I doing something for what the customer intends to pay?'

VALUE ADDED (VA) AND NON-VALUE ADDED (NVA) WORK

Take a look at these activities:

- ✓ Putting away a product into a storage location
- ✓ Moving the product using a forklift
- ✓ Loading the product into the grinding machine
- ✓ Grinding the product in compliance with the design specifications
- ✓ Unloading the product from the machine
- ✓ Invoicing the customer
- ✓ Reworking the product because it is not conforming to the technical specifications
- ✓ Auditing the accounting department for certifying the balance sheet

Which are the actual VA activities?

WASTE AND VALUE ADDED WORK

Unfortunately, not all the waste can be easily removed….