

COURSE GEST-H-501

LOGISTICS ENGINEERING AND MANAGEMENT

Session n°6

Prof. Dr. Alassane B. NDIAYE

COURSE PLAN 2024-2025 *(SESSIONS & DATES VIEW)*

- SESSION 01/M: 05/11/2024 – INTRODUCTION + BLOC 1 (THEORY & EXERCISES PLANNING & FORECASTING)
- SESSION 02/M: 09/11/2024 – BLOC 1 (THEORY & EXERCISES PLANNING & FORECASTING)
- SESSION 03/M: 12/11/2024 – BLOC 4 (THEORY & EXERCISES, WAREHOUSING & INVENTORY MANAGEMENT)
- SESSION 04/M: 16/12/2024 – *** BLOC 5 (EXPERT TALK, MAKE) + BLOC 8 (EXPERT TALK, REVERSE) ***
- SESSION 05/T: 19/11/2024 – BLOC 2 (SOURCING) + BLOC 3 (DELIVER)
- **SESSION 06/T: 23/11/2024 – BLOC 9 (QUALITY MANAGEMENT)**
- SESSION 07/M: 30/11/2024 – BLOC 6 (THEORY & EXERCISES, LOGISTICS NETWORK MODELLING & PLANNING)
- SESSION 08/M: 03/12/2024 – BLOC 4 (EXPERT TALK, INVENTORY) + BLOC 7 (EXPERT TALK, DISTRIBUTION)
- SESSION 09/M: 07/12/2024 – BLOC 7 (THEORY & EXERCISES, DISTRIBUTION LOGISTICS)
- SESSION 10/M: 10/12/2024 – BLOC 9 (EXPERT TALK, QUALITY)
- SESSION 11/T: 14/12/2024 – BLOC 10 (SUPPLY CHAIN INTEGRATION) + BLOC 11 (SUPPLY CHAIN STRATEGIES)
- SESSION 12/T: 17/12/2024 – BLOC 11 (SUPPLY CHAIN STRATEGIES) + BLOC 12 (SUPPLY CHAIN PERFORMANCE)

*** MAY BE CONVERTED TO WRAP-UP SESSION IN JANUARY BEFORE EXAM – (PREPARATION OF THE EXAM)***

BLOC 9:

QUALITY MANAGEMENT



CONTENT OF BLOC 9:

A. Introduction to the concept of "Quality"

- i. Understanding the concept of "Quality"*
- ii. Reasons behind the deterioration of "Quality"*
- iii. Quality issues from the customers' perspective*
- iv. Quality issues from the companies' perspective*
- v. The "Quality Loop"*
- vi. A tentative definition of the concept of "Quality"*

B. The five fundamental principles of Quality Management

C. Total Quality Management methods based on the Kaizen approach

- i. Definition of the concept*
- ii. Simple Suggestion Systems*
- iii. CEDAC Method*
- iv. Problem-Solving Groups*
- v. Ishikawa "Fishbone" Diagrams*
- vi. 5S*

D. Other Total Quality Management Methods

- i. 6 Sigma*
- ii. Autonomous teams*

E. Some concluding remarks to Quality Management

i. UNDERSTANDING THE CONCEPT OF “QUALITY”

- **Quality determines the success of a business**
- **Quality principles and rules have a strong impact on performance**
- **There are still difficulties in implementing the principles of Quality**

“Quality” is not a matter of good or bad will of people, but it results from a good or a bad management !

ii. REASONS BEHIND THE DETERIORATION OF “QUALITY”

- **Ambiguity of product specifications and working rules. Each actor has its own interpretation**
- **Machines are often out of order**
- **Work stations poorly lit or badly organised**
- **Work stations in disarray, cluttered aisles, mixed bins/trays**
- **Everyone tries to produce as fast as possible for operational profitability regardless of defects**

ii. REASONS BEHIND THE DETERIORATION OF “QUALITY”

- In case of accident: enhanced control after the event
- No preventive measures regarding the origin of the defect
- Purchasers continue to prefer cheaper suppliers
- Communication between services is insufficient everyone is convinced that the fault is somebody else's

There is a need to set up (formalize) in the company, a sound and continuous improvement plan.

iii. “QUALITY” ISSUES FROM CUSTOMERS’ PERSPECTIVE

- **What is quality?**

Is a Rolls Royce car of a better quality than a Toyota car?

- **Concept of Quality is not related to the intrinsic value of the product, but the expectations of the customer and his perception of the product**
- **It is the customer satisfaction that makes the quality of the product, not the efforts spent to make it !**

Quality must always be defined by a client-product relation:

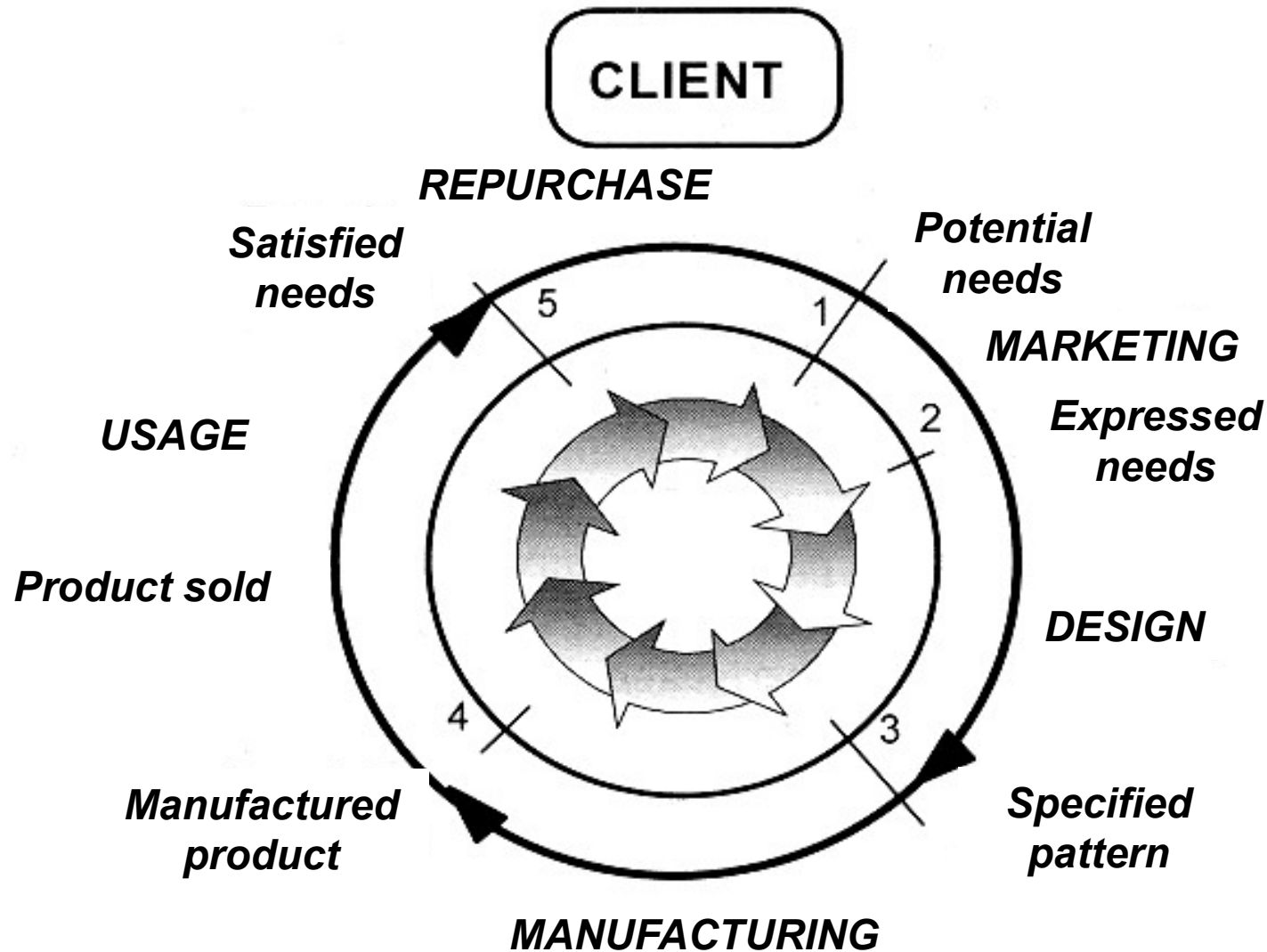
The quality of a product or service is its ability to meet the needs of the users/clients.

iv. “QUALITY” ISSUES FROM COMPANIES’ PERSPECTIVE

- Artisan or shopkeeper receives immediate appreciation from the customers and adjusts its offer.
- It is not the case of an industrial organization: the product nature and the number of people involved in the production do not allow a direct, permanent contact with the customer.
- In this case, “Quality” is a complex process defined by a two-steps mechanism:
 - ▶ *Specification of needs (simulates “contact” with the customer)*
 - ▶ *Production in accordance with the specifications*



v. THE “QUALITY LOOP”



v. THE “QUALITY LOOP”

Simple definition but not that easy to achieve.

Three major difficulties:

Difficulty 1: Number of players in the process

Numerous entities and persons are involved in the production process: → a high probability of occurrence of errors

- **Productivity** : Sum of the efforts provided by the different actors involved in the production process **[Additive characteristic]**
- A “No-Quality” at a point in the production process cannot be compensated by an “Over-Quality” made elsewhere in the process.

[Quality = Disjunctive characteristic]

v. THE “QUALITY LOOP”

Simple definition but not that easy to achieve.

Three major difficulties:

Difficulty 2: “Combinatorial”

- **Complex product = Opportunities for defects increase**
- **Example:**
 - ▶ *a simple car with 10,000 components.*
 - ▶ *If for each component the probability of default is 1/10 000, the proportion of finished vehicles without any default will be only 1/3 !!! (0.9999 power 10 000, say 36%)*

[There is only one principle that should apply : Zero default/defect]

v. THE “QUALITY LOOP”

Simple definition but not that easy to achieve.

Three major difficulties:

Difficulty 3: Induced cost

- **Who is willing to pay a (promised) defaultless car five times more expensive than the normal market price?**
- **Ensuring product “Quality”= YES, but not at the expense of very high induced costs (*inspections, controls, reworks/changes, etc*).**

["Quality" sets a real company culture with values & principles !]

vi. TENTATIVE DEFINITION OF THE CONCEPT OF “QUALITY”

- ✓ “Quality” is not a matter of good or bad will of people but it results from a good or a bad management !
- ✓ “Quality” sets a real company culture with values & principles !
- ✓ “Quality” must always be defined by a client-product relation

The quality of a product or service is its ability to meet the needs of the customers (users, clients).

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- C. Foundations of Total Quality Management**
- D. Total Quality Management methods based on the Kaizen approach**
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 - vi. 5S*
- E. Other Total Quality Management Methods**
 - i. 6 Sigma*
 - ii. Autonomous teams*
- F. Some concluding remarks to Quality Management**

5 FUNDAMENTAL PRINCIPLES TO GOOD QUALITY

Principe 1: meet customers expectations

Principe 2: Zero Defect/Fault/Failure

Principe 3: Preventive Approach

Principe 4: Objective monitoring method QM, with clear and pertinent rules

Principe 5: Continuous Progress

5 FUNDAMENTAL PRINCIPLES TO GOOD QUALITY

Principle 1 : Meet customers expectations

Compliance with the customers needs and expectations.

- **Must be applied to all levels of the company**
- **All services must be adequately informed**
- **“Quality” in the way of doing is necessary between these internal services who should behave like “clients-suppliers” do.**
- **“Over”-Quality must not occur !**

5 FUNDAMENTAL PRINCIPLES TO GOOD QUALITY

Principle 2 : Zero Defect/Fault/Failure

There is only one acceptable standard "target": zero defect!

- **No target such as "close to 100%"**
- **Expression in percentage may be dangerous :**
99.99% success rate means:
 - ***At least one flight would crash per day at some airports***
 - ***Tens of thousands of false medical prescriptions per day***
 - ***Tens of thousands of erroneous banking operations pd***
 - ***Hundreds of errors at ATMs per day***
 - ***Etc.***

5 FUNDAMENTAL PRINCIPLES TO GOOD QUALITY

Principle 3 : Preventive Approach

**Only one viable method: a preventive approach.
“It is better safe than sorry ”**

- **Avoid generating defects because this involves repair or scrapping costs.**
- **Investigate systematically the causes of the phenomena and treat them rather than addressing the effects.**
- **Anticipate upstream the operations’ chain and “drive” your suppliers to adopt the same approach.**

5 FUNDAMENTAL PRINCIPLES TO GOOD QUALITY

Principle 4 : Objective monitoring method for QM

Meet two essential conditions

- **A first essential condition: Have an objective measurement system with clear and indisputable indicators.**
- **A second essential condition: Formalize rules and methods for:**
 - *internal and external communication*
 - *training of employees (on these QM management tools)*
 - *ensuring their reproducibility at all stakeholders levels*

Develop and maintain a Quality Handbook

5 FUNDAMENTAL PRINCIPLES TO GOOD QUALITY

Principle 5 : Permanent Progress

Establish an effective system for continuous improvement

- **Business is not (can not be) a juxtaposition of specialists, performers and operators**
- **Managers and leaders are becoming “MCs”**
- **Think first to eliminate the causes of the problems rather than their effects. The effective resolution of the problems should involve the operators.**
- **Operators have extended responsibilities**

Quality : a long and continuous process of learning and progress

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E. Some concluding remarks to Quality Management

i. DEFINITION

- **Kaizen is a concept of continuous improvement:**
 - “**Everyone must continuously make improvements on his work/workplace**”
- **Japanese companies attach importance to Kaizen, they find that:**
 - **Despite the quality of equipment and methods, there is potential for progress that is expressed only during the implementation phase.**
 - **The person the better placed to suggest improvements is the one who uses the device daily.**
 - **TOYOTA leaders estimated that productivity gains are 50% from Kaizen methods and 50% from new investments (*a point of view which is shared nowadays by the Western industrials !*)**

i. DEFINITION

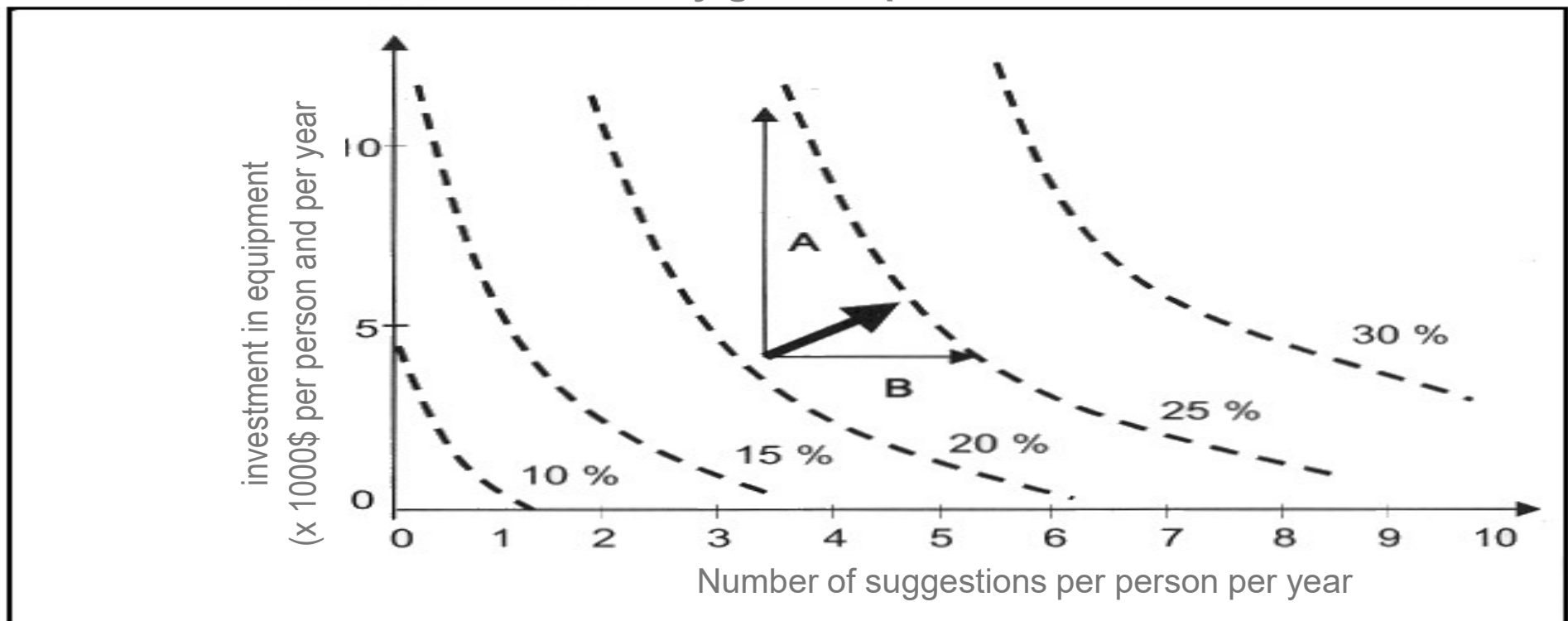
FUKUDA's study on several plants of the Japanese Sumitomo Group (rubber)

Increasing productivity gains from 20 to 25% can be achieved:

- *Either by an investment of about \$ 7,000 / person / year*
- *or by increasing the number of suggestions from 3.5 to 5.5 per pers/year*

One suggestion per person per year is equivalent to an investment of $\pm 3500\$$

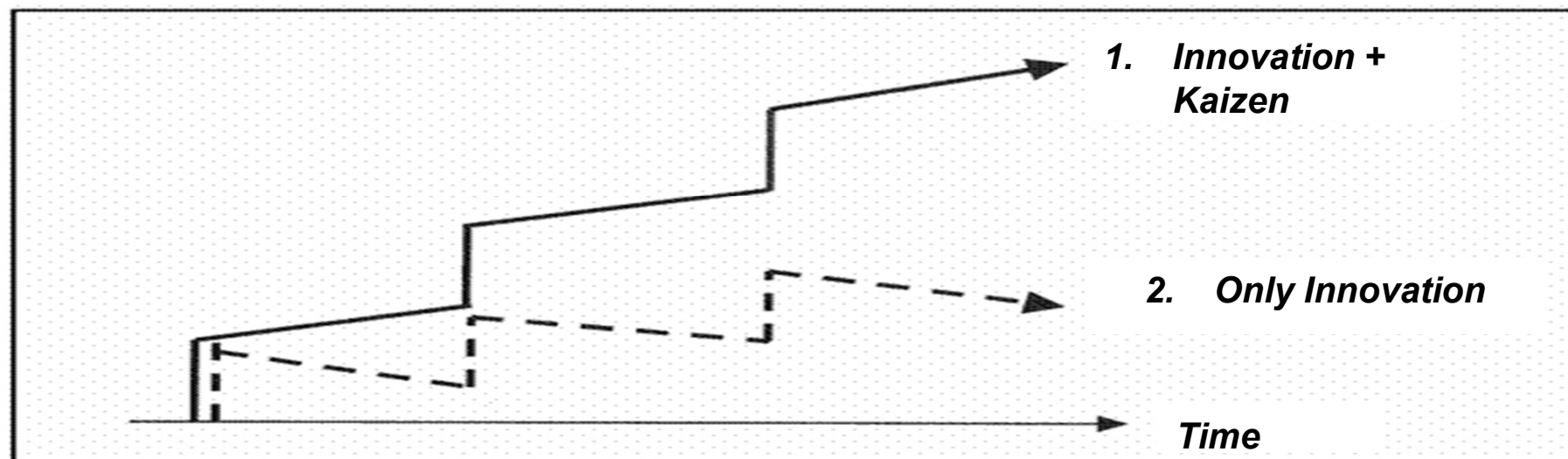
Productivity gains/improvement



i. DEFINITION

Masaaki Imai's study: performance increase always involves 2 components:

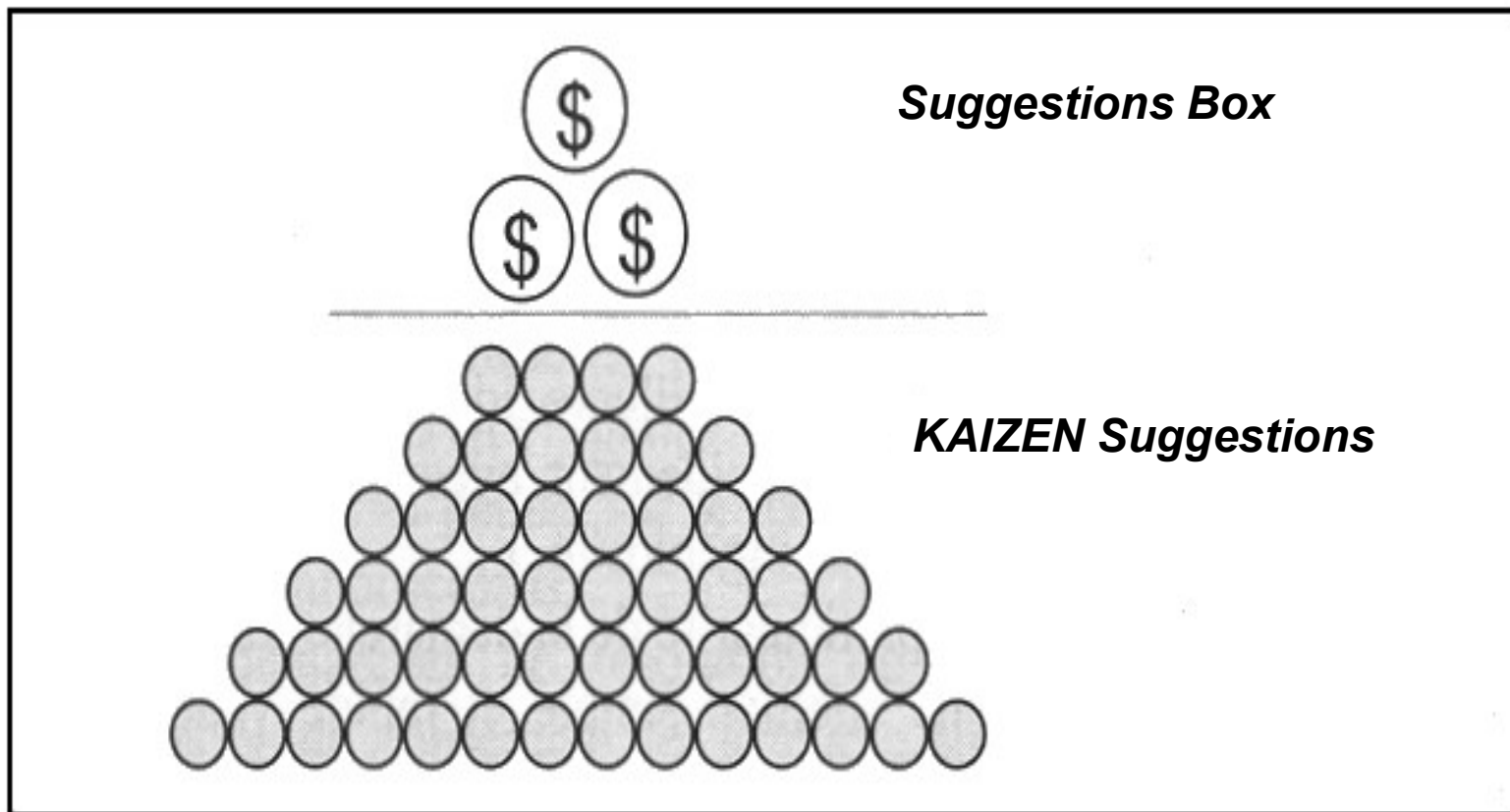
- *Structural modification in technology or organisation (innovation)*
- *All (non struct) improvements made continuously by the workers (Kaizen)*
- Consider 2 strategies: (1.) Innovation + Kaizen and (2.) Innovation only
 - ▶ In the absence of Kaizen, performance degrades after each tech or org change;
 - ▶ Kaizen allows to increase performance continuously between two major "jumps".



ii. SIMPLE SUGGESTION SYSTEMS / METHODS

- **Oldest example of application of Kaizen: Eastman Kodak in 1898:**
 - *William Connors, employee, suggests to clean the workshop windows to improve its brightness.*
- **1920s, Siemens, Michelin, etc.**
- **Then the Japanese have taken the concept successfully:**
 - *In an average 0,1 suggest applied /person/year in west country and 30 suggests applied / person / year in Japan*
- **But in the West, it is rather an elitist “Suggestion Box” rewarding one that saves more money while in Japan, it is rather to make suggestions for improvements involving more people.**

Suggestions Box and Kaizen suggestions. The first relates to ideas that allow to increase revenue. Kaizen focuses on the many ideas that provide each a bit of improvement but in total represent a significant amount.



ii. SIMPLE SUGGESTION SYSTEMS / METHODS

Main differences between "Suggestions Box" and "Kaizen suggestions"

	Suggestions Box	Kaizen Suggestion
Nature of idea	Brainstorming, the financial support of which is measurable.	Brainstorming that simplify everyday's job.
Motivation	Bonus is calculated from the cost of the proposal.	No Bonus (some exceptions), but different modes of recognition.
Management involvement	Low or zero.	Each manager is responsible of a number of suggestions implemented his team.
Results	1-2% of the proposed ideas. This yields 0.1 to 1 idea per person per year.	Over 80% of employees propose ideas, e.g. 5-10 ideas per person per year.

ii. SIMPLE SUGGESTION SYSTEMS / METHODS

Conditions for success

- All ideas are interesting, because even if they cannot be implemented, they reflect a problem to be solved.
- The proposals are discussed in Team: **adherence** and improved formulation
- The proposals are shown and visible by all
- Supervision and Support Services provide a help
- The realization is fast: powerful motivation for employees.

ii. SIMPLE SUGGESTION SYSTEMS / METHODS

Are integrated into a broader set :

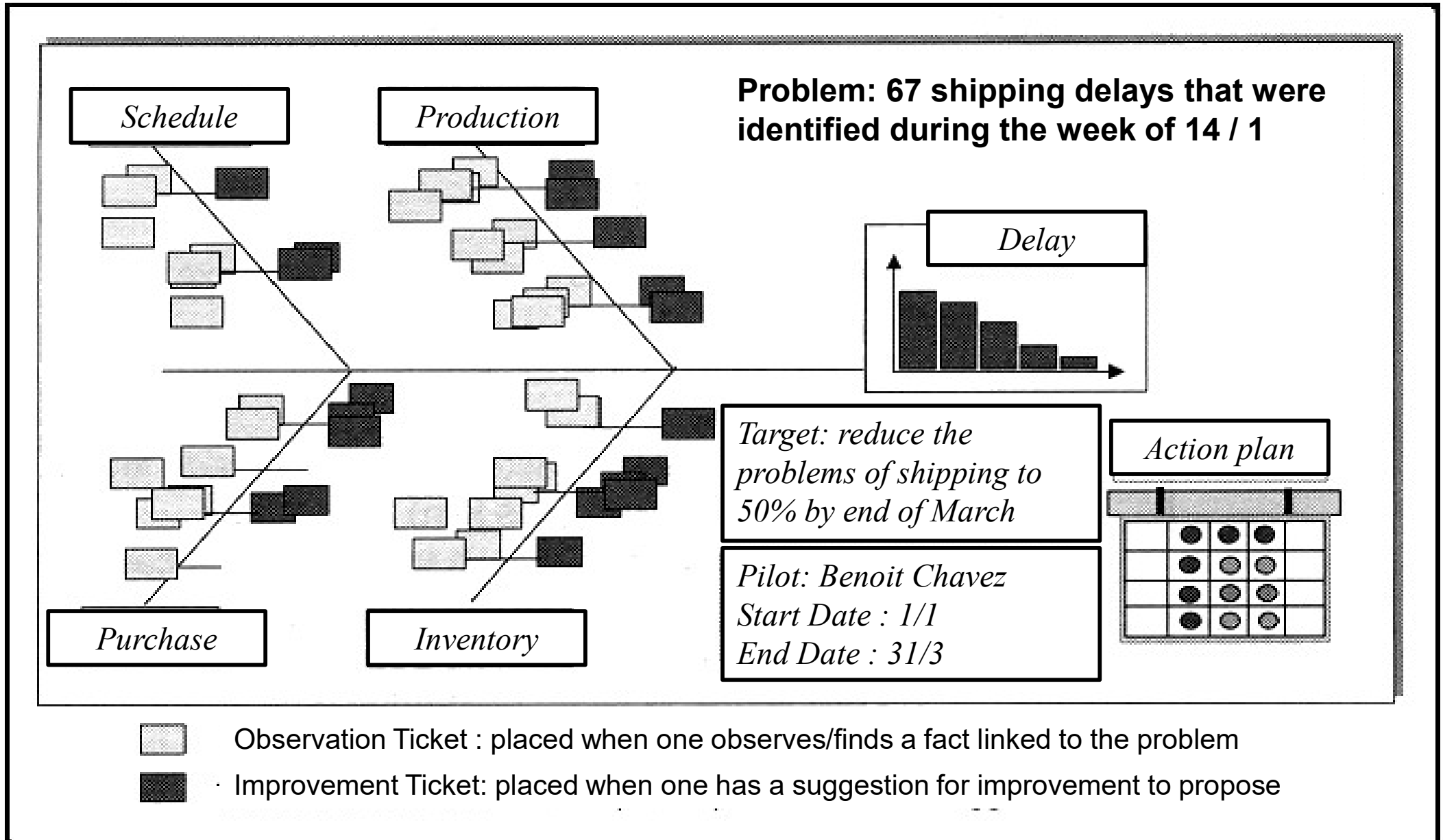
[In some cases, specific methods should be used in parallel]

- **Problem-Solving Groups** following a systematic approach to solve a given problem and made in consultation with management
- **Hoshin Method** : mobilize the entire team for a short time to reorganize the work tool
- **CEDAC** (Cause & Effect Diagram with the Addition of Cards)
- **Ishikawa "Fishbone" Diagram**
- **Etc.**

iii. CEDAC (CAUSE & EFFECT DIAGRAM WITH THE ADDITION OF CARDS)

- **Large flipchart, located at the place of work, dedicated to receive improvement ideas for a given problem (all types of problems).**
- **Everyone can make a proposal (summarised briefly on a ticket or post-it) even if he does not belong to the department concerned**
- **Every week a small group meets to review the proposals and initiate priority actions**
- **A CEDAC takes about 2 to 3 months and several CEDAC can be launched in parallel in the company.**

Example of CEDAC



iv. PROBLEMS SOLVING GROUPS

Developed by the Japanese for the Quality Forums/Circles who needed structured methods to help them in their approach to solving quality problems.

Currently widely used by all industrial groups

Phase	Name	Description
State the problem	WWWWWH	Who, What, Where, When, Why, How? The main issues in defining a situation
Measure and analyze	Record sheet	Table for recording the events
	Indicator	Measurement of a phenomenon and graphical representation
	Pareto	Ranking of the problem causes according to their importance
	5 "Whys"	Seek the causes then the causes of the causes to the root cause
	Cause-Effect Tree	To rank the possible causes of a problem methodically
Find solutions	Brainstorming	Creativity in groups to generate ideas
Decide	Multicriteria Analysis	Allocation of a series of numerical values to each solution (according to several criteria) in order to choose the best one
Implementation	Action plan	Monitoring table to view the progress of planned actions

v. ISHIKAWA FISHBONE DIAGRAM

STEP 1: RECORD ALL DEFECTS OBSERVED WHENEVER NON QUALITY OCCURS

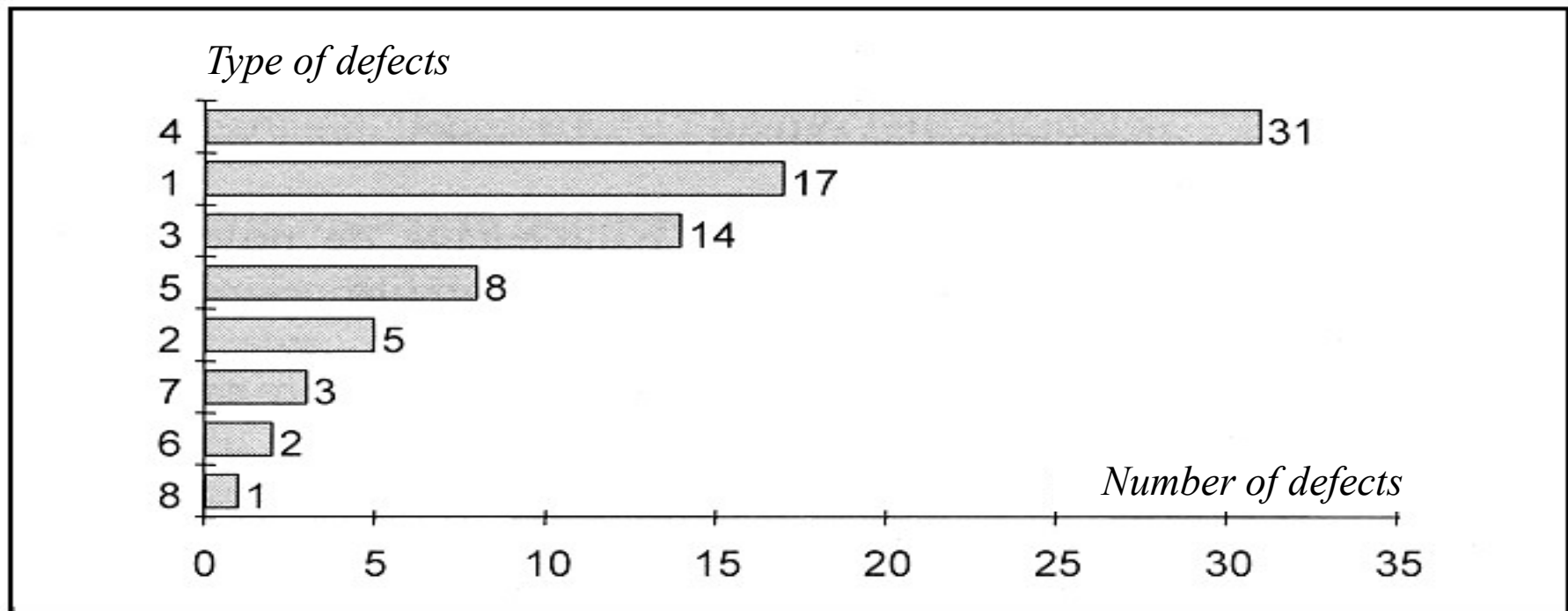
Record sheet							
N°	Defect	Mon.	Tue.	Wen.	Thu.	Fri.	Total
1	Insufficient solder	4	4	4	4	1	17
2	Shifted solder	1	2			2	5
3	Centering valve	2	3	4	3	2	14
4	Printing defect	8	5	8	3	7	31
5	Lack of material	2	1	1	2	2	8
6	Positioning error		1		1		2
7	Perforation	2				1	3
8	Wrong user guide				1		1
	Total	15	16	17	14	19	81

v. ISHIKAWA FISHBONE DIAGRAM

STEP 2: PARETO ANALYSIS ON THE PREVIOUS DATA RECORDED

- **Classify defects** in nature on the basis of their relative importance.
- **Find out the critical ones:** *from experience, a small number of defects represents the greater percentage of non-quality occurrence.*
- **These critical defects must be addressed in priority !!! (in this case n° 4)**

Pareto Analysis



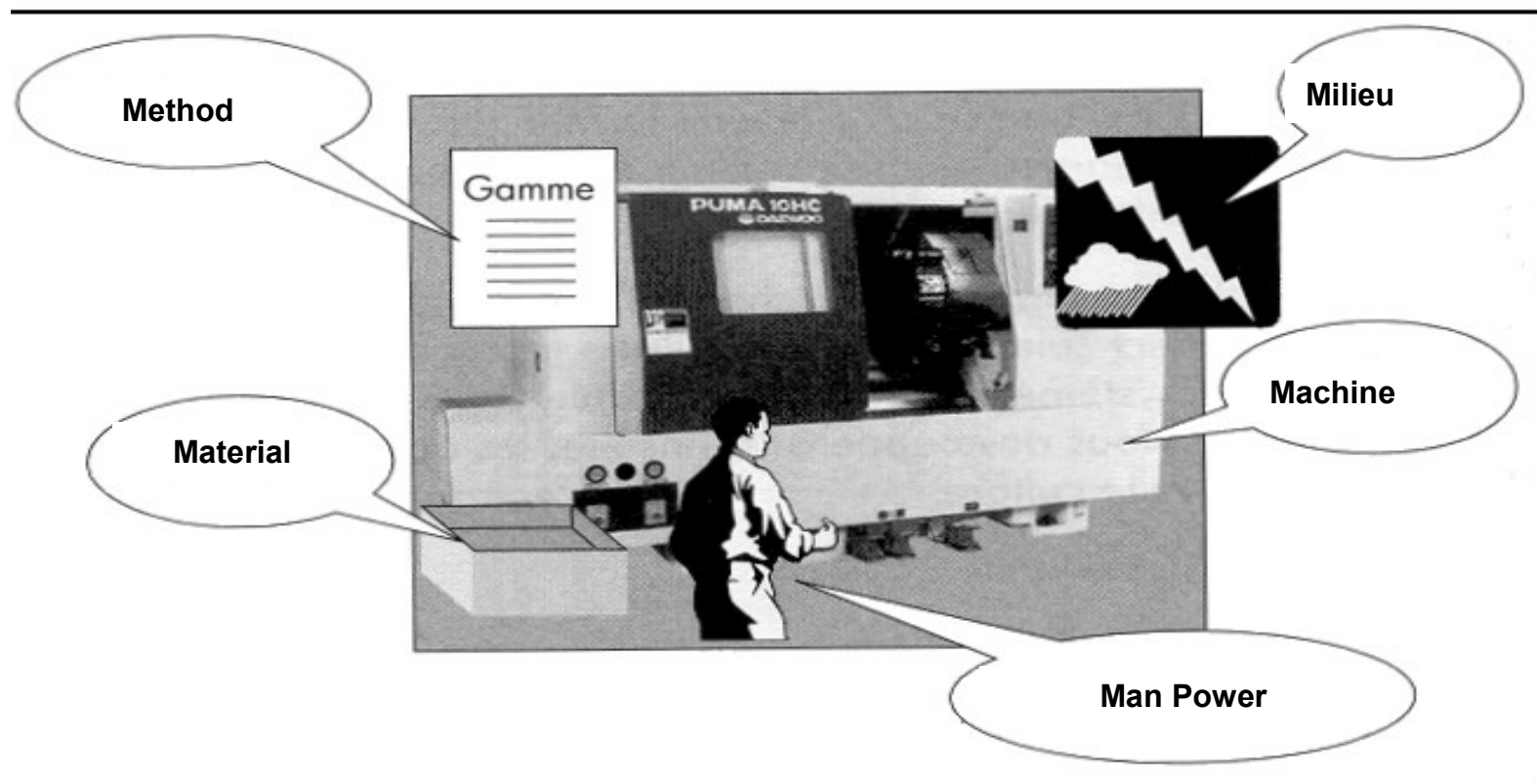
v. ISHIKAWA FISHBONE DIAGRAM

STEP 3: THE 5 MAIN BRANCHES OF THE ISHIKAWA DIAGRAM

KEY HYPOTHESIS:

The causes/origins of a DEFECT are to be sought in the five categories, ("**5**"**M**):
Materials, **M**an power, **M**achine, **M**ethods, **M**ilieu (environment of work)

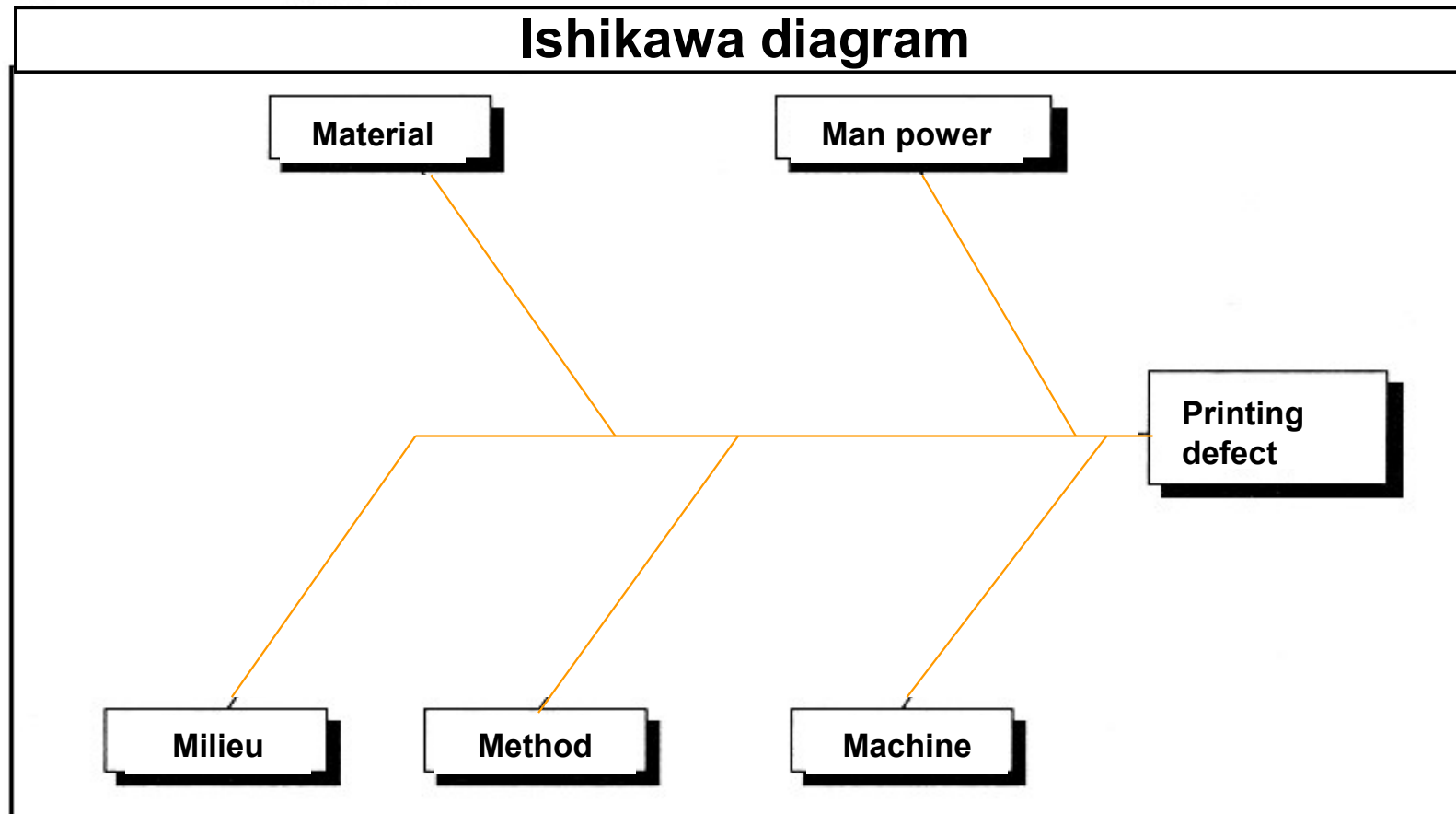
5M Process



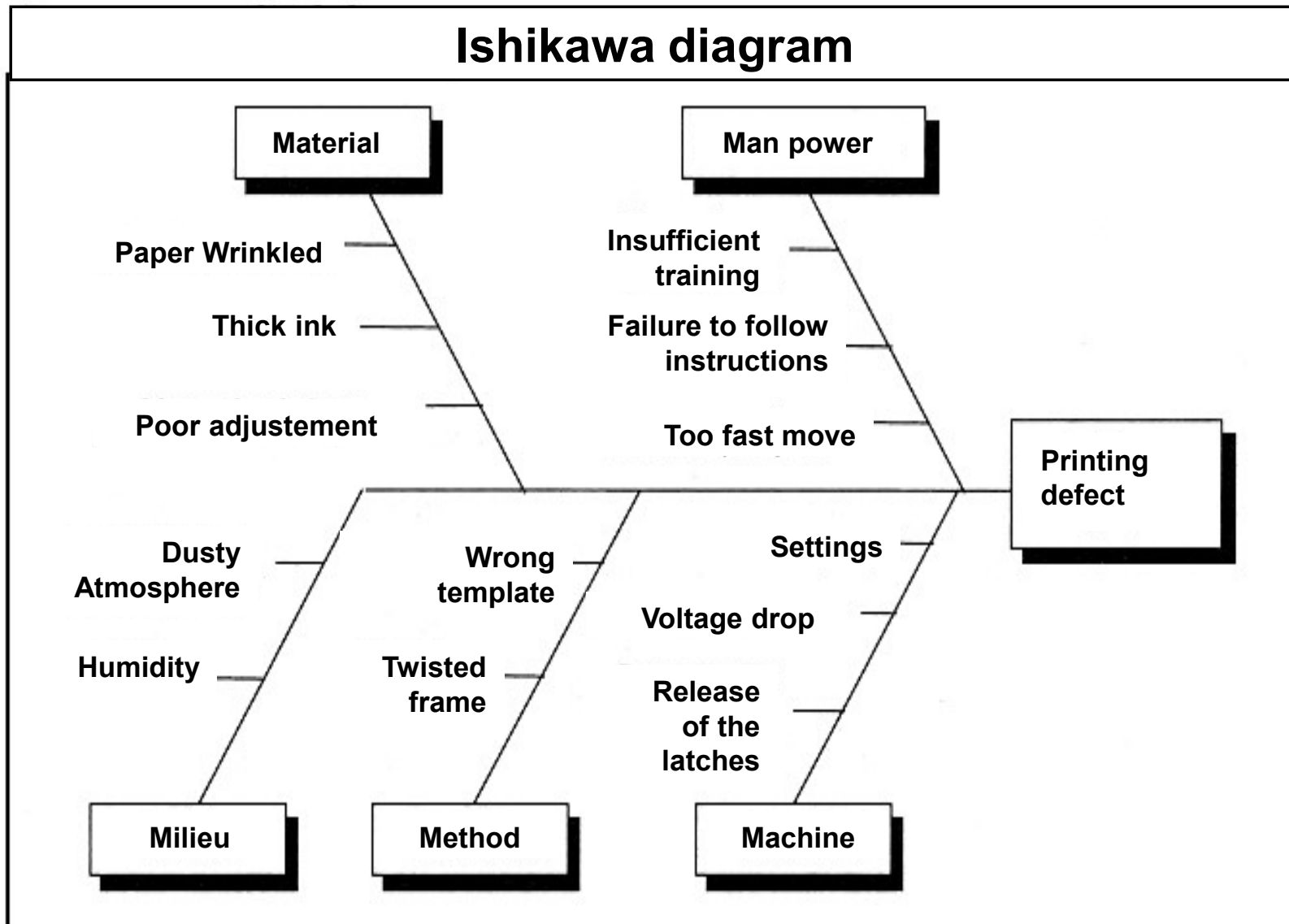
v. ISHIKAWA FISHBONE DIAGRAM

STEP 4: ELABORATE THE FISHBONE (CAUSES-EFFECTS) DIAGRAM

- Elaborate the backbone of the diagram with the defect and the 5 branches.
- For each branch, seek the causes → the causes of the causes to the root cause



v. ISHIKAWA FISHBONE DIAGRAM



v. ISHIKAWA FISHBONE DIAGRAM

STEP 5: ANALYSE THE FISHBONE (CAUSES-EFFECTS) DIAGRAM

- Analyse for each branch, the “tree” of causes and classify them
- Focus primarily on the most important.

Ishikawa diagram classifies the possible causes of failure according to their origin

Its effectiveness stems from two elements:

- Helps decompose a complex problem
- Helps to avoid forgetting some important causes

It's a powerful tool.

vi. 5S

- illustrates the principles of Kaizen
- Developed in Japan, late 1980
- Applies to offices, shops, stores
- Mobilize all employees to improve the cleanliness and “spirit” of the working environment/place

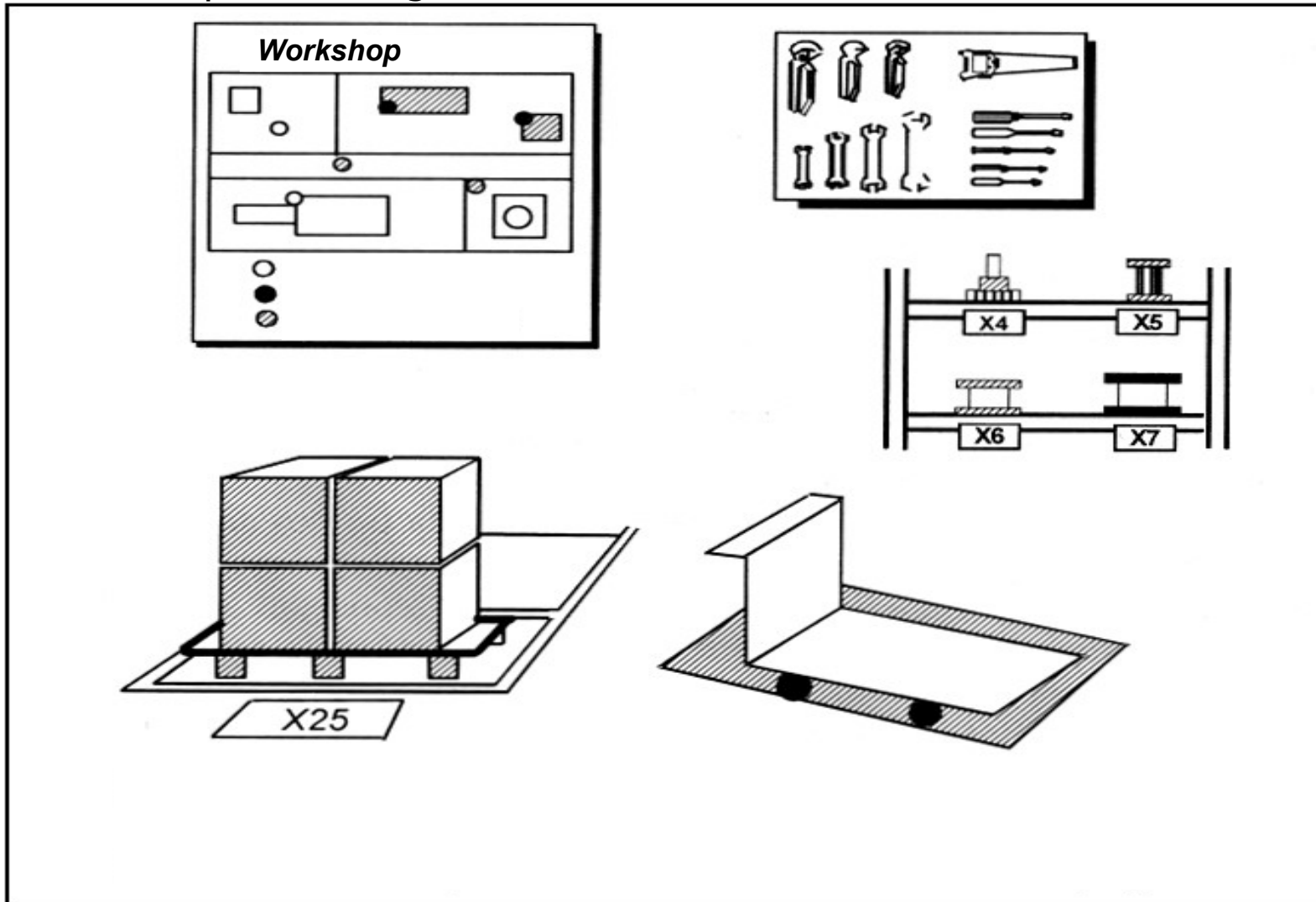
The "5S" process = to get there:

- **SEIRI** (remove all that does not belong or is not necessary to the working place)
- **SEITON** (sort/put in order)
- **SEISO** (keep it clean)
- **SEIKETSU** (standardize, visualize, good practices)
- **SHITSUKE** (respect rules)

5S is an extremely efficient and cost effective process !

vi. 5S

Example of 5S organization



vi. 5S

- **Best choice to promote organizational learning**
 - ✓ *Work in groups, develop a common language, organize, plan, solve problems, communicate, etc.*
- **Implementation of a "5S" project in a medium company takes about 2 years: strong commitment and investment in time are critical**
- **Helps to introduce gradually a "new culture of quality and performance" favourable to the successful realisation of Just-in-Time and Total Quality plans, or the successful introduction of new technologies.**
- **Many companies see it as "a base camp" for the conquest of other success peaks.**

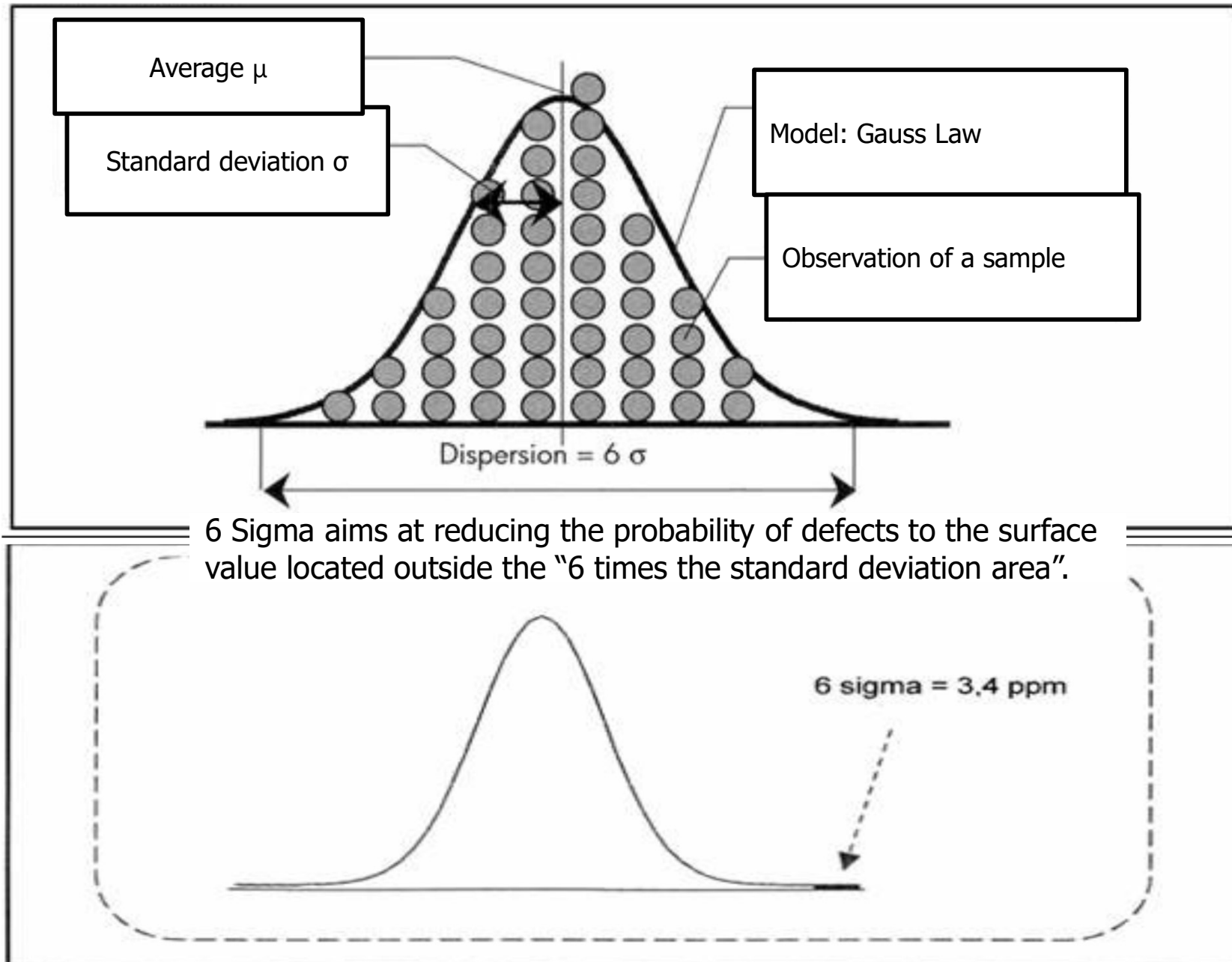
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i. SIX SIGMA

- Developed by Motorola in the 1980s as a way to reach "zero defect/default", it is widely used nowadays.
- Goal= reduce the risk of defects to a few parts per million (ppm), e.g. percentage of non-compliant products is less than what a normal probability distribution leaves beyond six standard deviations.
- To say that a process is "six sigma" means that there is a probability of defects less than 3.4 DPMO,
 - *e.g. the probability of occurrence of a defect is less than 3.4×10^{-6} or 0.0000034*
- To say that a process is "3 sigma" mean:
 - *20,000 letters lost per hour,*
 - *5000 failed surgeries per week, etc.*

"Six sigma" = very powerful, very demanding method for continuous improvement!



i. SIX SIGMA


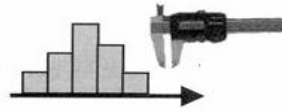
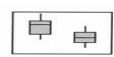
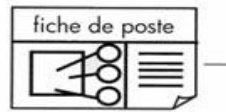
The normal distribution law gives theoretically a value of 2,7 DPMO at 6σ . A correction factor (shift) of 1.5σ , is applied in order to obtain 3.4 DPMO.

For more concise information about the process and this correction factor and its application in a manufacturing process:

http://en.m.wikipedia.org/wiki/Six_Sigma

i. SIX SIGMA

5-steps methodology

Phase	Step
Define 	Select an improvement project (what do we want to improve?) Identify the associated processes and data. Evaluate the cost of the problem and the cost of the project. Submit the project to the Management.
Measure 	Define the characteristics of quality. Measure the quality characteristics and other influential values on the result.
Analyse 	Search for the causes of defects and solutions to solve them. Conduct tests and trials.
Improve	Propose a solution. Validate the solution
Control 	Monitor results Gain support to the new solution from all stakeholders. <u>Standardize</u> the solution.

i. SIX SIGMA

A dedicated team to manage a 6-Sigma project with well-defined roles supported by extensive training

Name	Roles
Master Black Belt	Member of the Management Committee. Identifies projects and assigns them to Black Belts. Supports Project.
Champion	Project Sponsor. Patron of activity / Process owner.
Black Belt (pilot training several weeks)	Leads and develops teams to improve cross-functional issues. Advises management on the implementation of improvement plans. Diffuse six sigma tools within the company.
Green Belt	the Black Belt's assistant (part time)

ii. AUTONOMOUS TEAMS

- Is part of a commitment to deploy continuous improvement and address the need for responsiveness, pro activeness and adaptation.
- This is the form of organization best suited to solve daily problems and improve performance
- Strengths (and prerequisites)
 - *The work is done in teams (it is better to share the work, change job post/be flexible if necessary, or help a co-worker)*
 - *The team is autonomous for some decisions (depending on employees skills and maturity levels)*
 - *The team is responsible for its performance*

ii. AUTONOMOUS TEAMS

The autonomy increases as we move down through the table

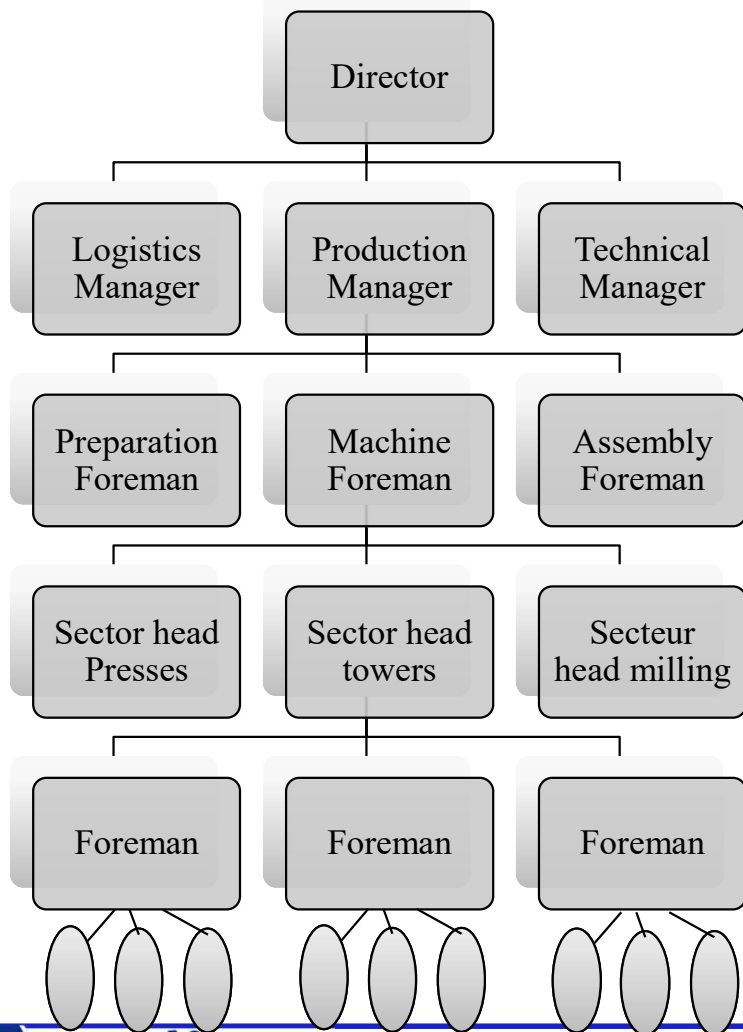
Technical missions	Management missions
Auto-control - Changes in manufacturing – Record of shutdown causes - Cleanliness and organisation of the workspace – Visual signs.	Distribution of work between team members – Transmission of instructions to the next team - Administrative follow-up of production (quantity, quality)
Simple adjustments of the equipment - Statistical process control (SPC) - Maintenance at the first level (lubrication).	Supplies – Weekly planning of production - Calculation and update of performance indicators - Management of absences and holidays.
Difficult settings – Maintenance at the second Level - Definition and implementation of workstations.	Analysis of failures - Conduct of corrective and preventive actions (problem solving) - Creation of the working documentation - Training of newcomers.
Participation in the selection of equipment and industrialization of new products. Management tasks.	Processing of customer orders and invoices - Participation in the selection of suppliers - Participation in the preparation of budgets and annual plans continuous improvement - Participation in recruitment.

ii. AUTONOMOUS TEAMS

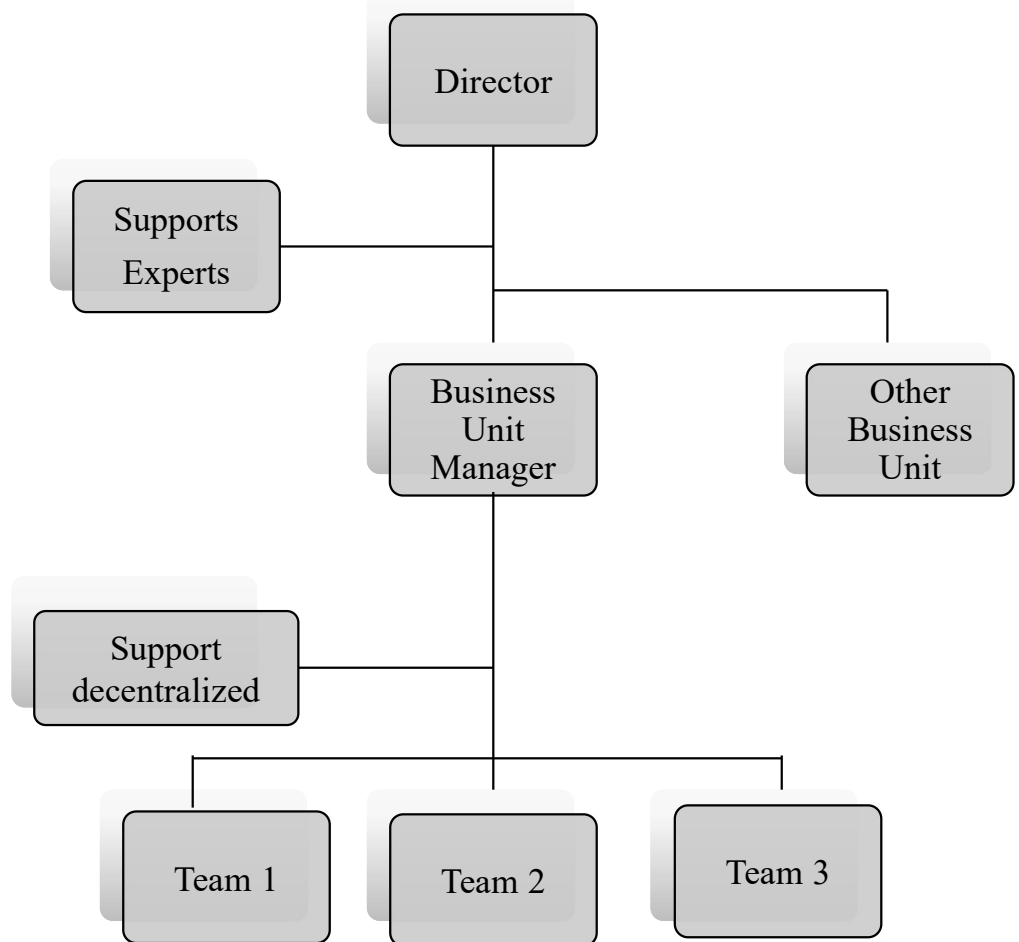
Evolution of the Organization Chart

The autonomous team has generally from 5 to 15 members

Organization chart before



Team organization

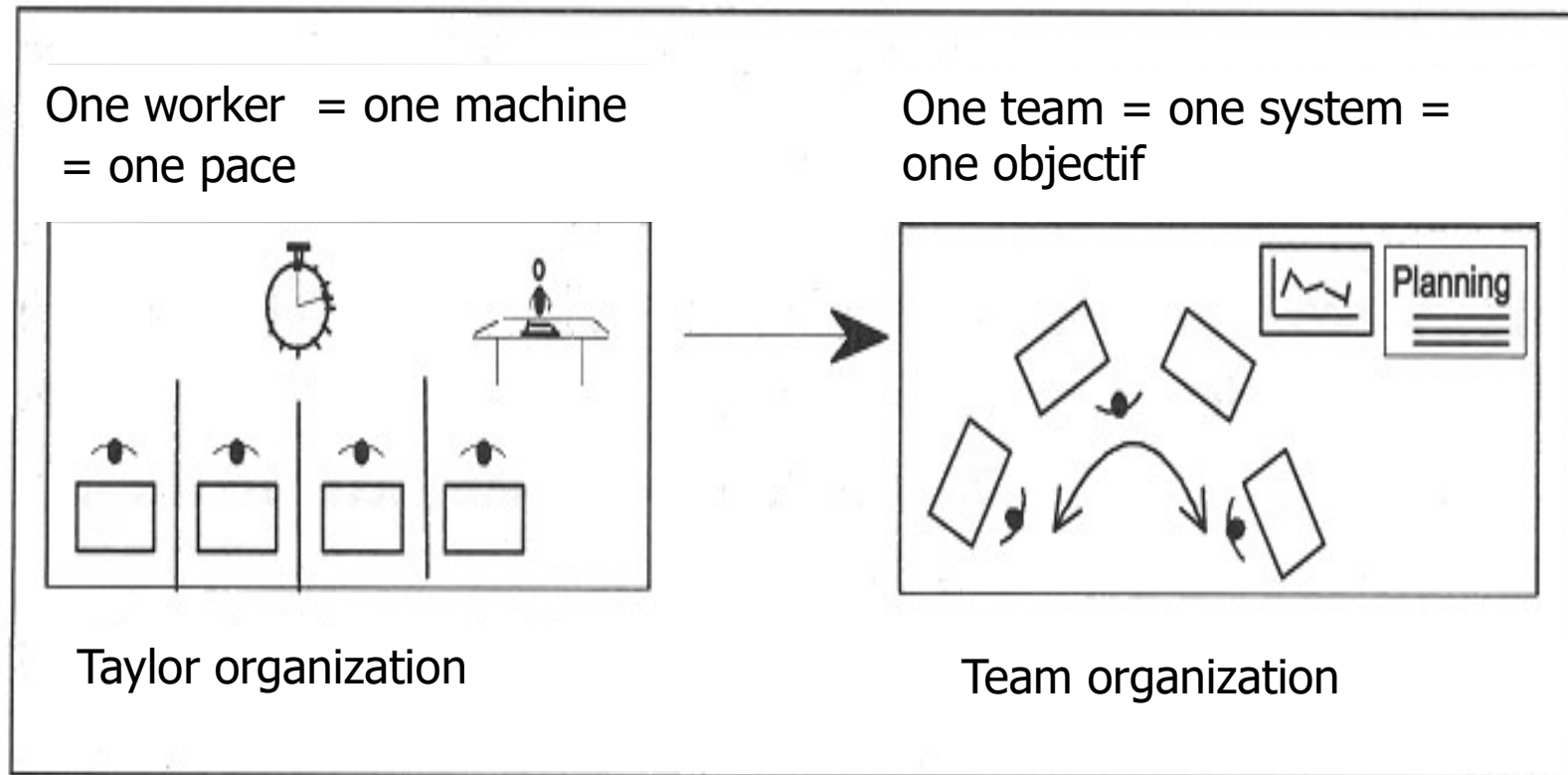


ii. AUTONOMOUS TEAMS

Evolution of the Organization Chart

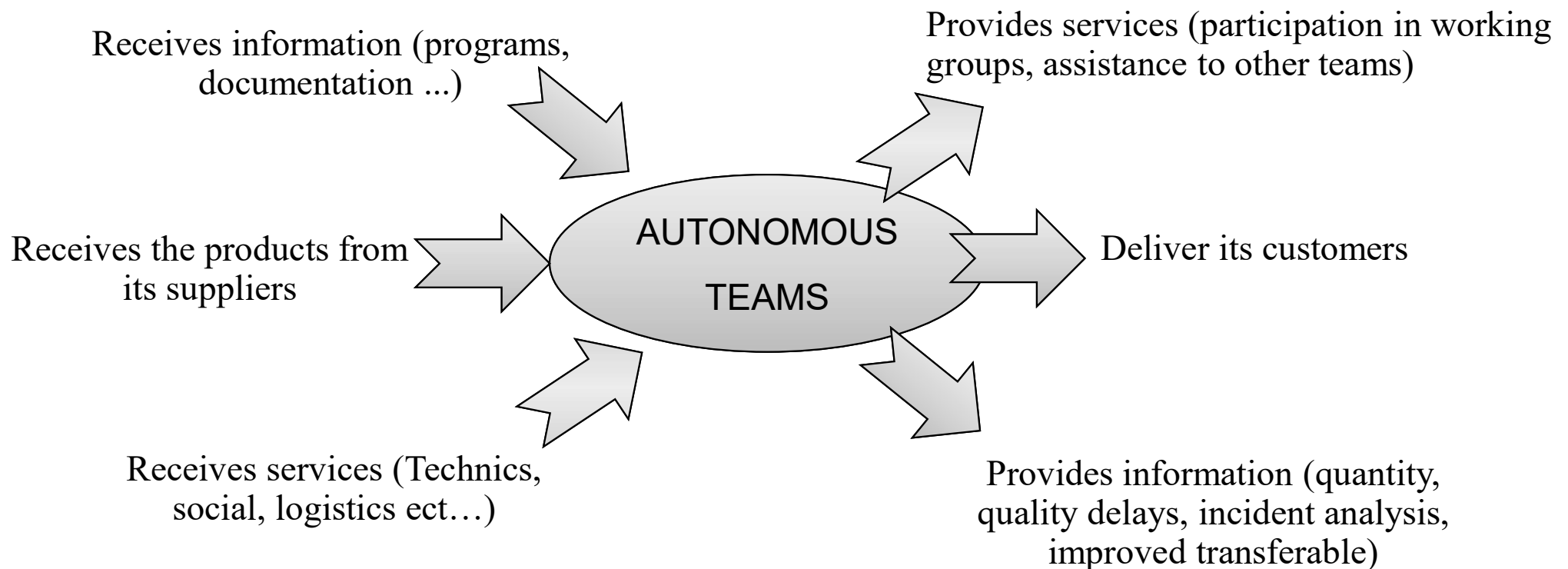
The autonomous team has generally from 5 to 15 members

From Taylor organization to Team organization



ii. AUTONOMOUS TEAMS

- **Integration, network, the hierarchy is no longer the exclusive information holder**
- **Team operations: accountability and transparency**
 - **Fundamental change in labour organisation: faces obstacles & resistance.**
 - **Duration (on average it takes 5 years to achieve satisfactory results)**



CONTENT OF BLOC 9:

A. Introduction to the concept of "Quality"

- i. Understanding the concept of "Quality"*
- ii. Reasons behind the deterioration of "Quality"*
- iii. Quality issues from the customers' perspective*
- iv. Quality issues from the companies' perspective*
- v. The "Quality Loop"*
- vi. A tentative definition of the concept of "Quality"*

B. The five fundamental principles of Quality Management

C. Total Quality Management methods based on the Kaizen approach

- i. Definition of the concept*
- ii. Simple Suggestion Systems*
- iii. CEDAC Method*
- iv. Problem-Solving Groups*
- v. Ishikawa "Fishbone" Diagrams*
- vi. 5S*

D. Other Total Quality Management Methods

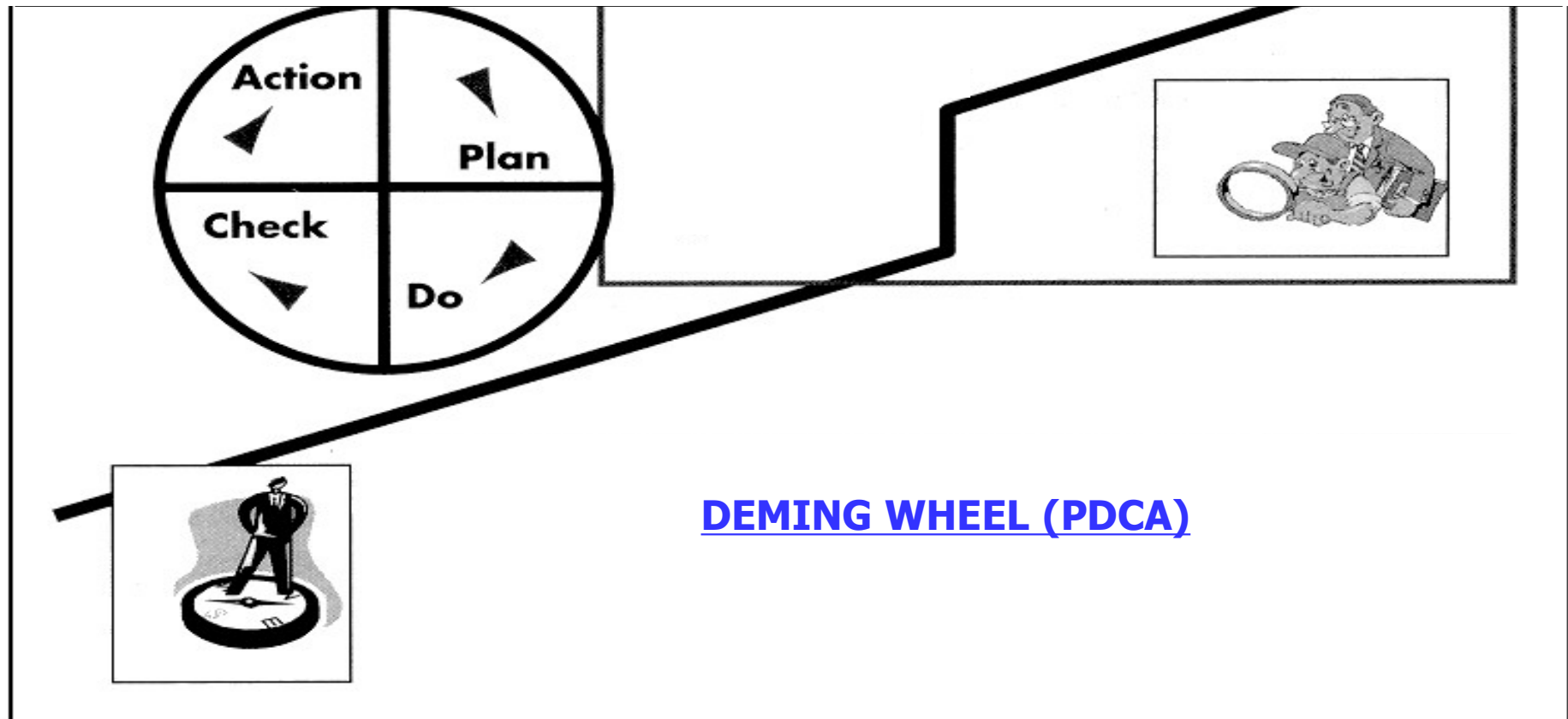
- i. 6 Sigma*
- ii. Autonomous teams*

E. Some concluding remarks to Quality Management

- **Quality must always be defined by a client-product relation:**
The quality of a product or service is its ability to meet the needs of the users/clients.
- **The unique viable approach is the “zero default” approach.**
- **“Quality” should not only focus on the product *stricto sensu* but rather on the underlying system, procedures and people that make the product.**
- **More and more companies build their business on this statement.**
- **A necessary move is the permanent improvement process (permanent progress) through the PDCA (Wheel of Deming) methodology:**
 - **PLAN** - *HR, materials, resources, equipment, production process, delivery...*
 - **DO** - *Design, production, management, measurements*
 - **CHECK** - *measure deviations, audit, customer feedback, analyse data*
 - **ACT** – *control of non conform products, repairs, preventive checks , lessons*

Preventive approach through the continuous improvement process (permanent progress) based on the PDCA (Wheel of Deming) concept:

- **PLAN** - HR, materials, resources, equipment, production process, delivery...
- **DO** - Design, production, management, measurements
- **CHECK** - measure deviations, audit, customer feedback, analyse data
- **ACT** – control of non conform products, repairs, preventive checks, lessons

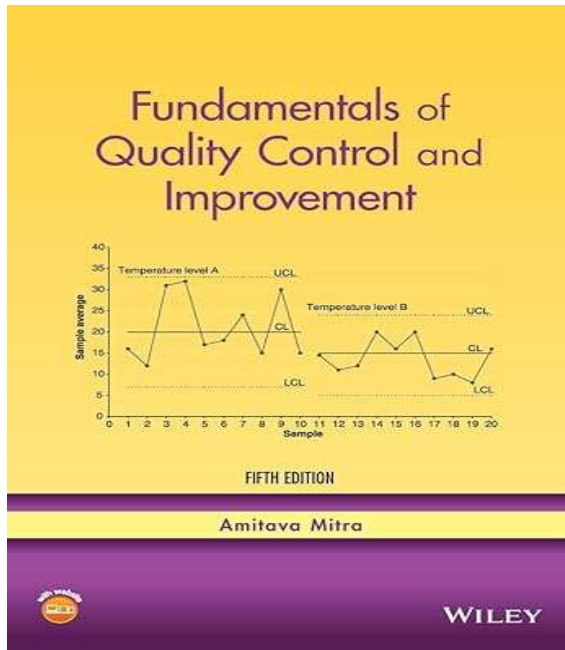


Total Quality is certainly a method, an ongoing commitment, but it is mostly a state of mind and a corporate culture that must involve every staff member.

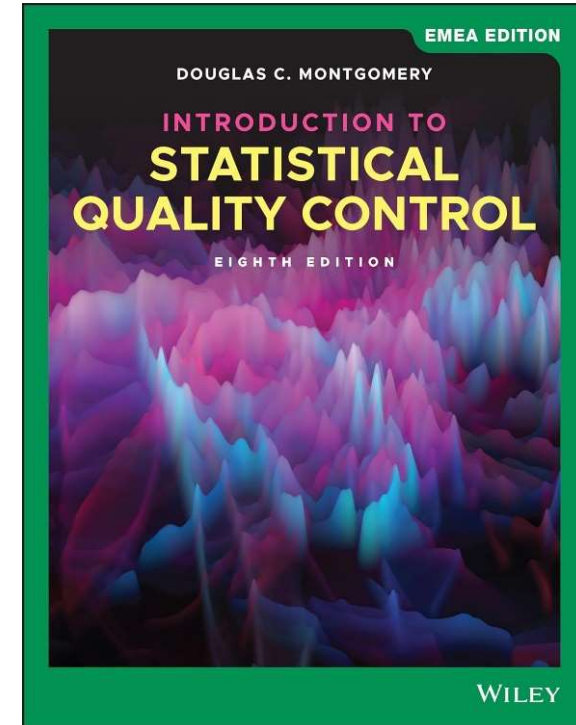
All the methods for continuous improvement (permanent progress) are based on the Preventive approach.

These methods for continuous improvement must be:

- ***Collective: cooperation of all stakeholders***
- ***Based on an **organized process** (definition clear, precise and simple of the problem, methods simple and effective resolution)***
- ***Resolutely **turned towards "action"** and not only "findings".***



Amitava Mitra
Fundamentals of Quality Control and Improvement
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Douglas C. Montgomery
Introduction to Statistical Quality Control
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http://en.m.wikipedia.org/wiki/Six_Sigma

COURSE PLAN 2024-2025 *(SESSIONS & DATES VIEW)*

- SESSION 01/M: 05/11/2024 – INTRODUCTION + BLOC 1 (THEORY & EXERCISES PLANNING & FORECASTING)
- SESSION 02/M: 09/11/2024 – BLOC 1 (THEORY & EXERCISES PLANNING & FORECASTING)
- SESSION 03/M: 12/11/2024 – BLOC 4 (THEORY & EXERCISES, WAREHOUSING & INVENTORY MANAGEMENT)
- SESSION 04/M: 16/12/2024 – *** BLOC 5 (EXPERT TALK, MAKE) + BLOC 8 (EXPERT TALK, REVERSE) ***
- SESSION 05/T: 19/11/2024 – BLOC 2 (SOURCING) + BLOC 3 (DELIVER)
- SESSION 06/T: 23/11/2024 – BLOC 9 (QUALITY)
- **SESSION 07/M: 30/11/2024 – BLOC 6 (THEORY & EXERCISES, LOGISTICS NETWORK MODELLING & PLANNING)**
- SESSION 08/M: 03/12/2024 – BLOC 4 (EXPERT TALK, INVENTORY) + BLOC 7 (EXPERT TALK, DISTRIBUTION)
- SESSION 09/M: 07/12/2024 – BLOC 7 (THEORY & EXERCISES, DISTRIBUTION LOGISTICS)
- SESSION 10/M: 10/12/2024 – BLOC 9 (EXPERT TALK, QUALITY)
- SESSION 11/T: 14/12/2024 – BLOC 10 (SUPPLY CHAIN INTEGRATION) + BLOC 11 (SUPPLY CHAIN STRATEGIES)
- SESSION 12/T: 17/12/2024 – BLOC 11 (SUPPLY CHAIN STRATEGIES) + BLOC 12 (SUPPLY CHAIN PERFORMANCE)

*** MAY BE CONVERTED TO WRAP-UP SESSION IN JANUARY BEFORE EXAM – (PREPARATION OF THE EXAM)***